CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
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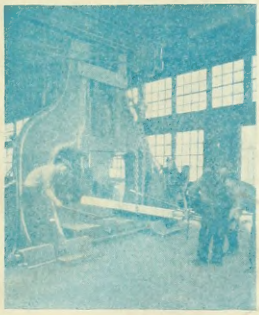
The Human Element



LIBRARY JUN 16 1919 UNIVERSITY OF TORONTO

That power in man that makes of him a man
Unfolds not only in himself, for if we scan
The product of his hands we find therein
There shines the reflex of his traits that win;
So, if the actual man himself is sought,
Look not on him, but see what he has wrought.

It is the intelligent interest and co-operative spirit combined with the skilful hands of our manufacturing force which give that undisputed excellence to

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The Nationally Known—First Quality

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THE BEST FOR ALL MACHINE WORK

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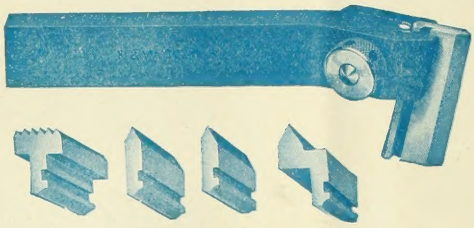
SMALL TOOLS

P. & W. Threading Tools



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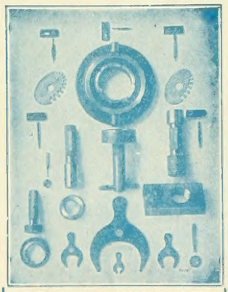

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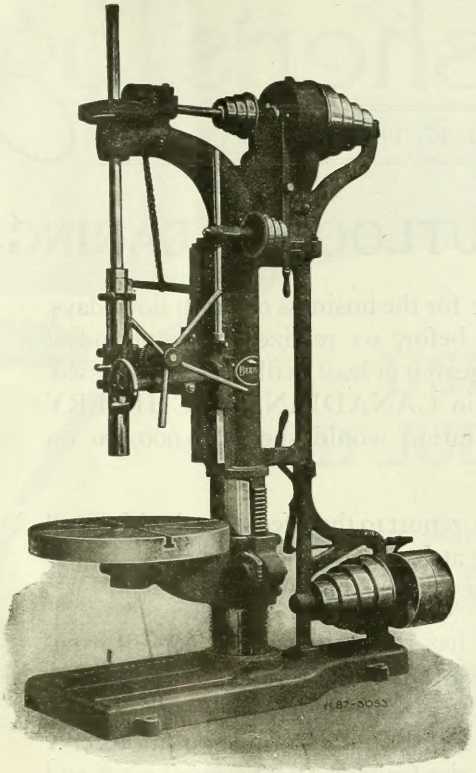

Bertram MACHINE TOOLS

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We'll be pleased to submit photographs and full details on any line or lines in which you are interested.

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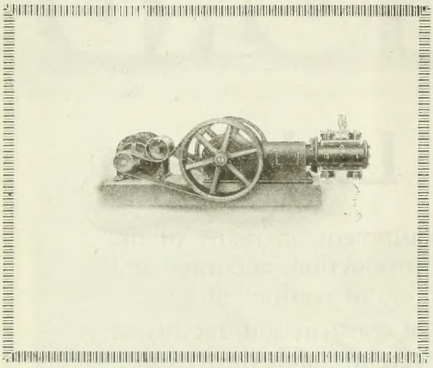
The Short Belt Drive For Compressors Saves Space



Have you been wondering how you can fit that compressor into your power house? Here is the solution—the short-belt drive.

We build both single-stage and two-stage machines—straight-line and duplex with this type of drive.

Less floor space
Less belt expense
No belt stretching
Capacities up to 2,000 ft. per min. with short-belt drive.

Send for our booklet on how to apply the short-belt drive to the best advantage.

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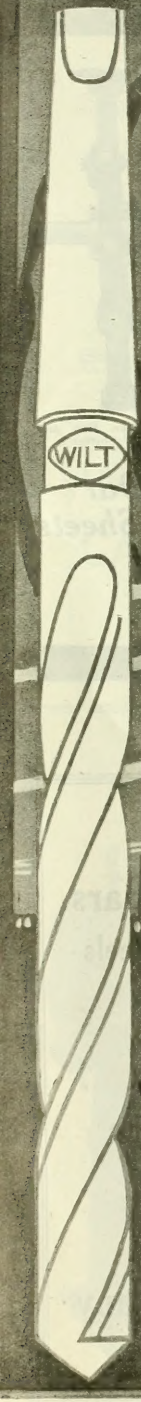
Machine shop foremen and superintendents who invariably specify **"WILT"** when requisitioning tools know **WILT Drills** are superior—are absolutely guaranteed against defective material and workmanship—are rigidly inspected before being shipped. To produce more, use **WILT Drills.** To produce more economically, use **WILT Drills.** Elimination of breakage alone will save you much.

HIGH SPEED AND CARBON TWIST DRILLS



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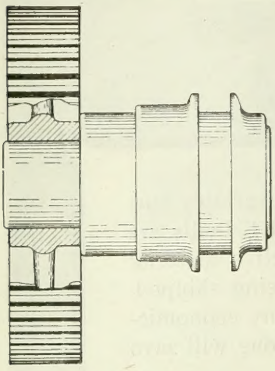
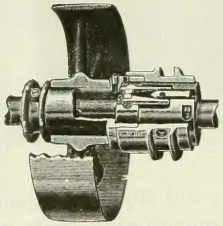
"Where there's a WILT —there's the Way."

THE JOHNSON FRICTION CLUTCH

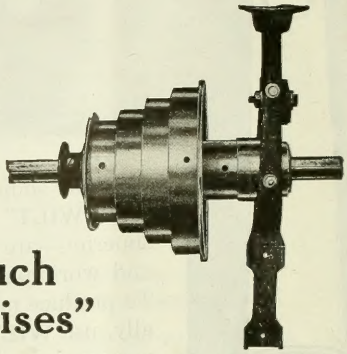


Gear Mounted on Clutch Hub.



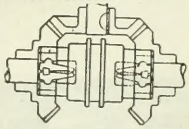
Pulley on Hub Clutch Engaged.

"Records are Much Better Than Promises"



Cone Pulley on Hub and Style "A" Shifter

Ask us for the names of builders of machines such as you make. For every requirement there is a JOHNSON FRICTION CLUTCH.



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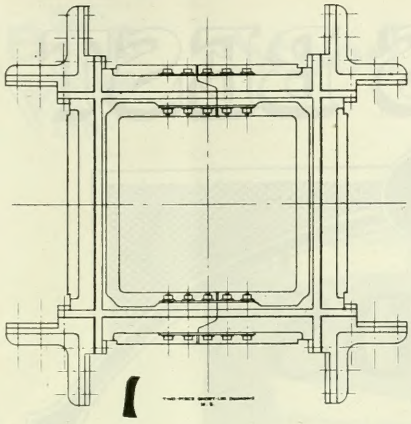

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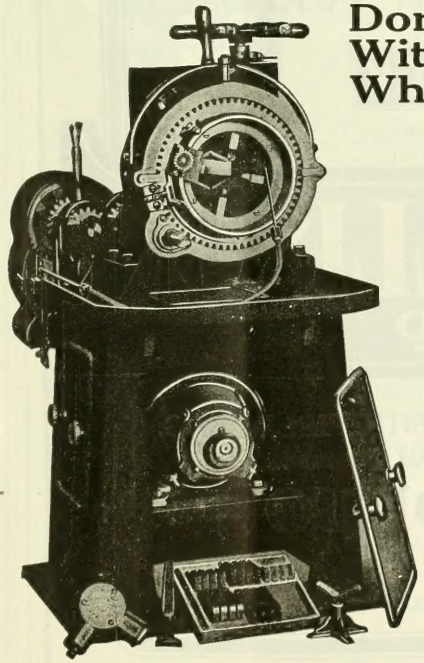

Don't Talk Man Shortage With Six Men on Pipe Work Where There Should be One

Don't let urgent work lag for the want of men while you employ a gang of men instead of one man and a

Forbes Pipe Cutting and Threading Machine

on your pipe work.

The old-style stock and die method of cutting off 15-in. pipe required six men. It can now be done with one man and a Forbes Machine.

The motor-driven type follows the pipe-fitting work wherever an electric wire can be run. No hauling of heavy pipe to and from a stationary machine.

In the Forbes Machine the dies revolve. The pipe remains fixed in the self-centering vise. And the threads cut! They're the kind that make tight joints, because they're clean, accurate.

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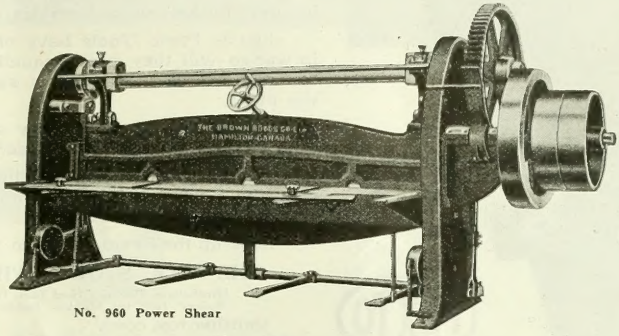
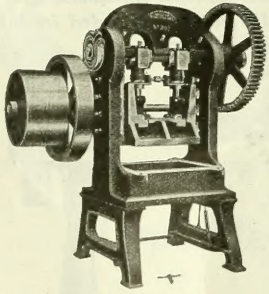


No. 960 Power Shear



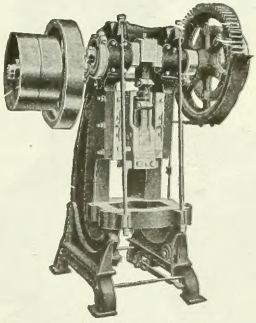
No. 20½ Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

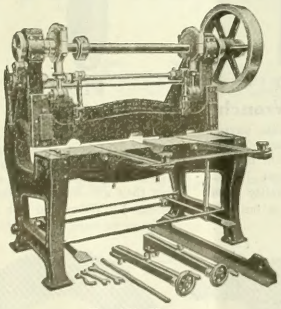
Inexperienced help and 24 hours' daily service will test the best machines.

Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

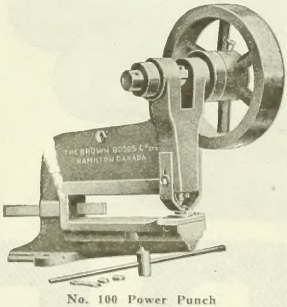
Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 215 Power Press



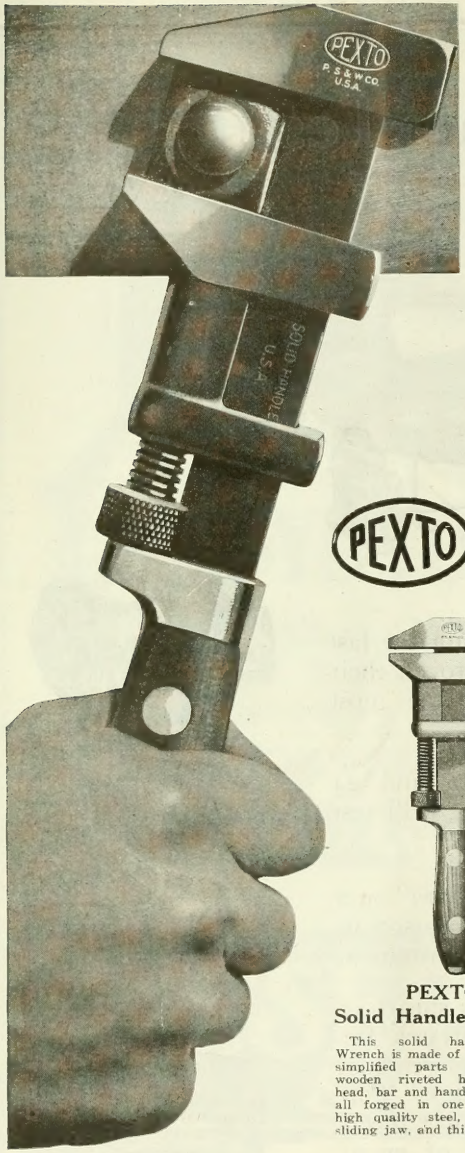
No. 404 Shear



No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada



PEXTO STAMINA

(Ability to see things through)

Applied to Pexto Wrenches it is ability to take hold, hang on, come through and stand ready to do the job over and over again.

Each Pexto kind is the same in this respect. Solid Handle, Solid Steel, and Pipe Wrenches are mighty significant terms when associated with Pexto. This name adds a reputation built up through 100 years of tool making. It is surety for long wrench service.

Just as Pexto Tools have played an important role in war so will they prove equally capable in the reconstruction process. Stamina is as necessary in one as in the other.

Every phase of present day activity has need for the ability that is designed and forged into Pexto Tools.

Whether you are buying a hundred tools for the shop or a single wrench for your home you'll find the same genuine economy in Pexto.

Look up the Pexto Dealer in your immediate vicinity.

THE PECK, STOW & WILCOX COMPANY

Manufacturers Mechanics' Hand Tools, Tinsmiths' and Sheet Metal Workers' Tools and Machines, Builders' and General Hardware.

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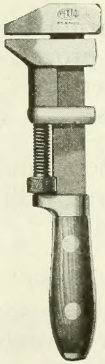
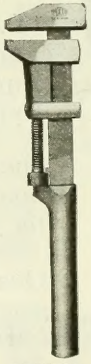


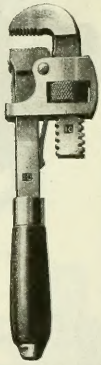
PEXTO
Solid Handle Wrench

This solid handle Pexto Wrench is made of three strong, simplified parts with heavy wooden riveted handles. The head, bar and handle frame are all forged in one piece from high quality steel, next is the sliding jaw, and third the screw.



PEXTO
Solid Steel Wrench

Like its solid handle partner this wrench is made of three simple parts—the head, bar and handle are all forged in one piece from high quality steel. This Pexto Wrench is built for heavy duty.



PEXTO
Pipe Wrench

This Pexto Wrench carries out the highest ideals of Pipe Wrench design. The hardened jaws of steel grip like a vise, yet they are easily tightened or released. When you get a pipe wrench be sure it's Pexto-made.

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TOOLS FOR USE ABOUT THE HOME AND FARM FOR THE MECHANIC IN EVERY TRADE

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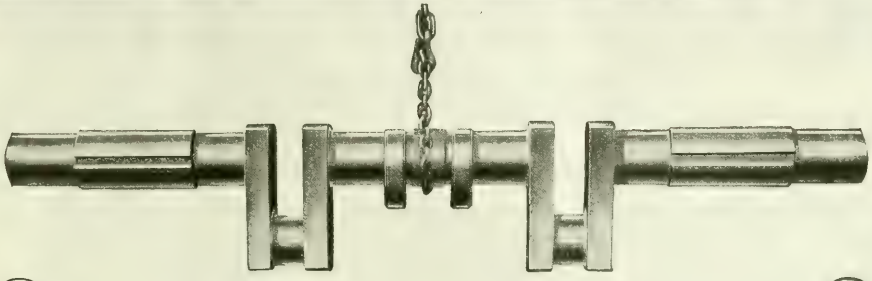

Why Worry? Bring It To Us If It Is a Forging.

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"ARGO" BRAND *HIGH-SPEED* STEEL

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RALPH B. NORTON, AGENT
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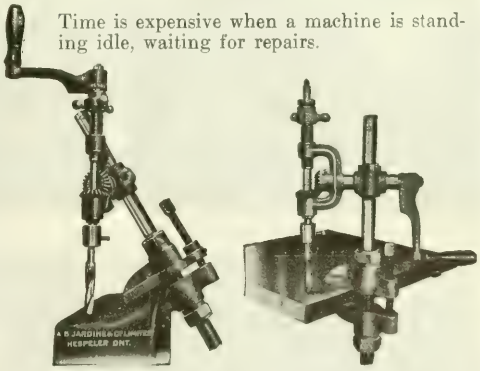
Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
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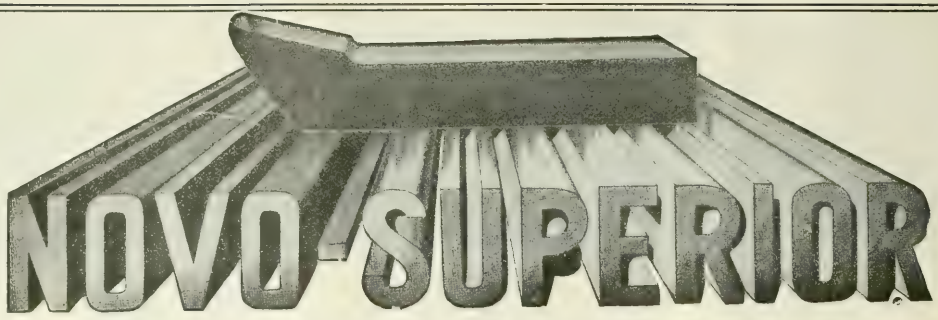

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Circular Saws for wood and for hot or cold metal cutting
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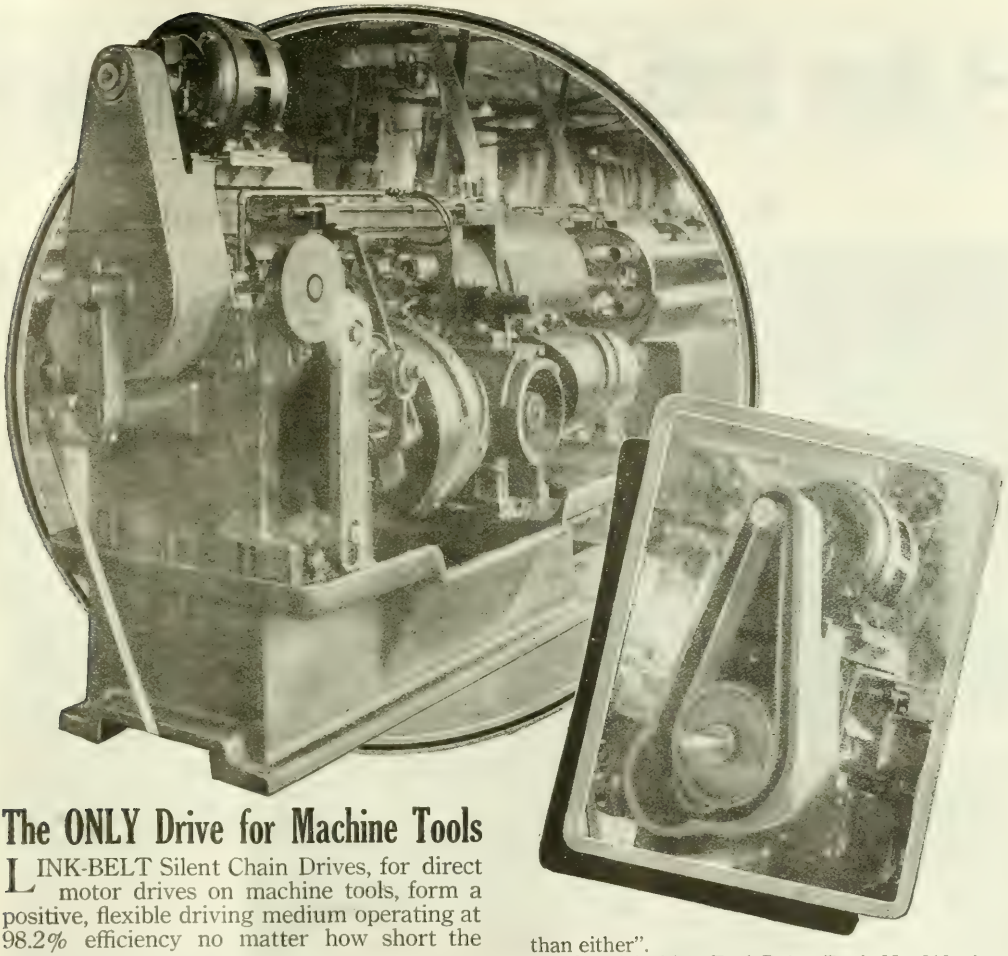

The ONLY Drive for Machine Tools

LINK-BELT Silent Chain Drives, for direct motor drives on machine tools, form a positive, flexible driving medium operating at 98.2% efficiency no matter how short the centers.

Belts slip, waste power and cause tools to "chatter". Gears wear, become noisy and afford no "cushion" between motor and machine.

Link-Belt Silent Chain Drives absorb the shock when heavy loads are applied thus lengthening the life of the machine. They never slip, never waste power and improve the product. They are "flexible as a belt, positive as a gear, more efficient than either".

Our Machine Tool Drive Book No. 312 gives details. Let us send you a copy.

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THREE AND ONE-HALF AND FIVE-TON "FLUID COMPRESSED" STEEL INGOTS.

The Nova Scotia Steel & Coal Co., realizing the importance of "fluid compression" as a valuable aid in producing reliable and first-class steel products, procured by purchase the Canadian license from M. Harmet, of St. Etienne, France, whereby they own the sole rights in this Country to use his process. This they considered in accordance with their policy of taking advantage of every important metallurgical development, thus advancing with modern progress, and particularly that their high reputation as manufacturers of the best marine, railway and machine forgings obtainable should be maintained.

The "fluid compression" plant laid down at Sydney Mines, N.S., consists of one group of four Harmet presses, each of 1,250 tons and capacity to handle 3½ to 5-ton ingots; and one of 4,000 tons to handle ingots up to 30 tons.

The product of this process is used in the manufacture of high-grade forgings, such as locomotive axles, crank shafts, marine forgings, artillery tubes and armor plate of the highest grade; in fact for all commodities in which maximum reliability and homogeneity of structure enter and are demanded.

STELLITE

"Not Steel but its Master"

PROPER PROCEDURE + STELLITE = PRODUCTION AND ECONOMY

One of Toronto's new industries was presented by us with a Tool-Holder Bit of No. 3 STELLITE to try out on Cast Iron.

They made tests with the best brands of High Speed Steel as against STELLITE, and found that they were able to run at double the speed and feed by using STELLITE.

"AS A MATTER OF FACT A TOOL BIT OF ⅜-inch square STELLITE HAS TURNED OFF 35,000 TIMES ITS OWN WEIGHT OF CAST IRON IN TEN DAYS."

As a consequence of their own tests they laid out their transmission to accommodate STELLITE and are now getting a much larger production than they had estimated.

We visited them recently and warned the Superintendent to save his shop-ends of STELLITE, as they were worth $2.00 per pound to his firm.

This was like getting money from home, as he had already decided to use STELLITE without this added incentive.

ASK FOR DEMONSTRATION.

Deloro Smelting & Refining Company, Limited

TORONTO
200 King Street West

H.O. and WORKS: DELORO, ONT.

MONTREAL
315 Craig Street West

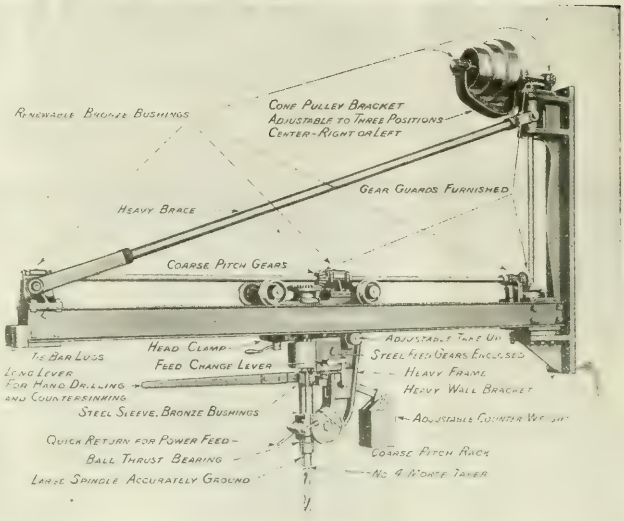
A "Strikingly Different" WALL RADIAL DRILL

This is a real machine tool. Careful design and high-grade materials contribute to its great success and economy. Much wider range is possible on this drill than the ordinary radial. The head is exceptionally rigid, yet moves with extreme ease from end to end of arm. For the crowded shop this drill is ideal, as when not in use it can be pushed back out of the way.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



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Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

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Structural Steel and Steel Plate Work of every Description

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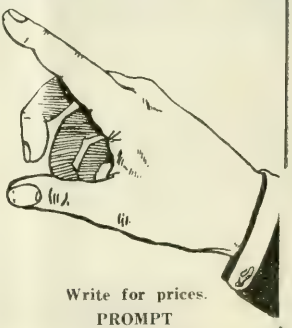

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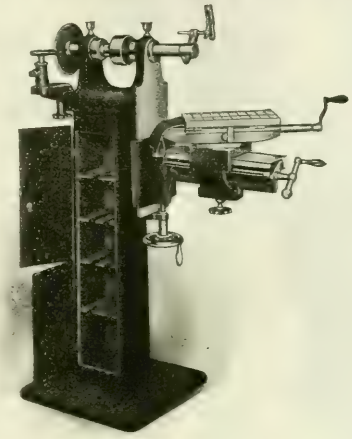
From Cutters and Tools Kept Sharp on

GARVIN No. 3 UNIVERSAL
CUTTER AND SURFACE GRINDERS



GARVIN No. 3, Universal Cutter and Surface Grinder
Use Code—Banish

Simple **Light Running** **Accurate**

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriege is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14" x 6"; SURFACES, 9½" x 6"

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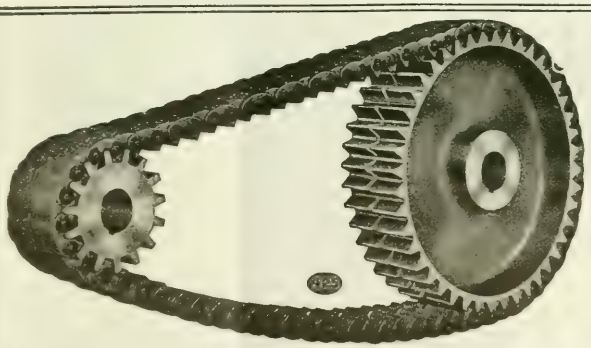
Spring and Varick Streets ***(Visitors Welcome)*** **50 Years New York City**



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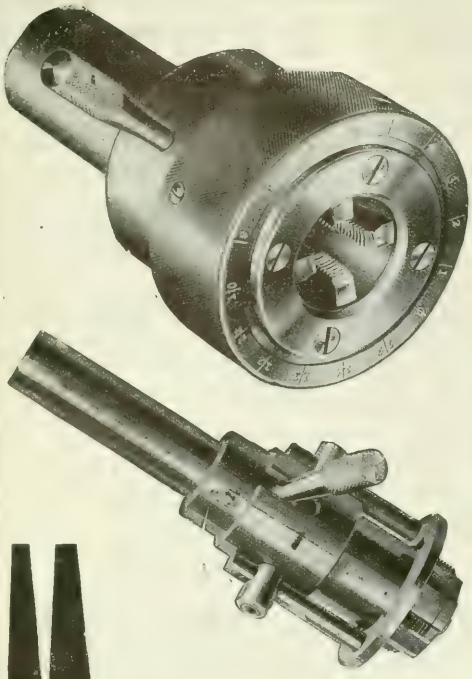

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Collapsing Taps and Self-Opening Dies

No reversing—no stripping; no need of taking the shell out of one lathe and putting it in another machine.

Fifty per cent. faster and more accurate than solid tools. No chance of work getting off centre.

Murchey Machine & Tool Company

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FENWICK FRERES AND CO., 15 Rue Fenelon, Paris, France.

Tap Chucks that Save Tap Costs

BICKNELL-THOMAS FRICTION CHUCKS

reduce tap breakage to the vanishing point. These chucks will hold the tap to the limit of its endurance, but a sudden strain sufficient to break the tap will cause the grip to loosen instantly. They are particularly adapted for tapping to the bottom of blind holes, for special work and—owing to their compact design—for use on multiple spindle machines.

Made in four sizes—one-eighth to one inch. Straight or Morse taper shanks.

BICKNELL-THOMAS CO.

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We wanted something original—this is what we got

"BOTH in these operations and half another — I'll show you later — completed in the time our old taps took to do one; that, I guess, is why we continue to use your Victor Collapsible Taps."

It was the often-heard story of time saved, of costs lowered, of all threads clean and smooth. And it was pleasant to hear.

Victor Tool Company
Waynesboro, Pa.
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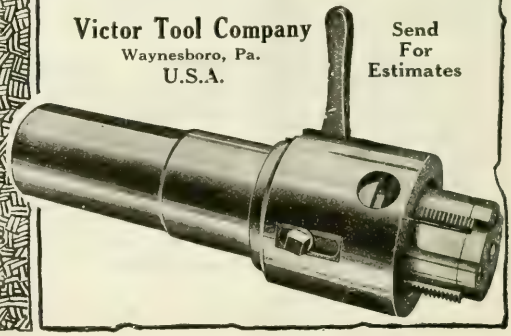
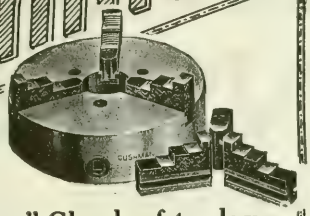


Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

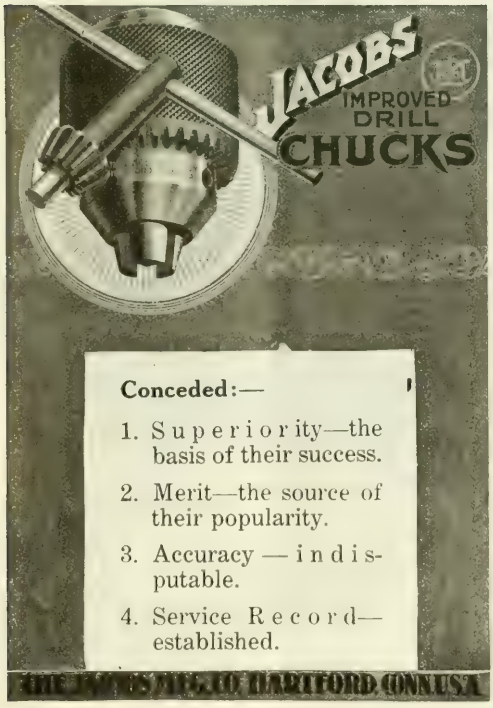
And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

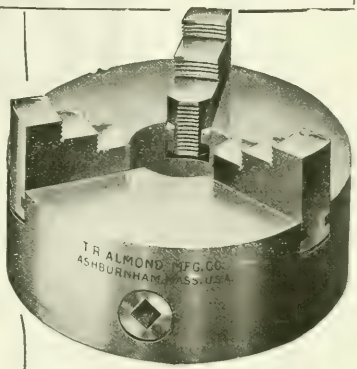
Cushman Chuck Co., Hartford, Conn.

CHUCKS

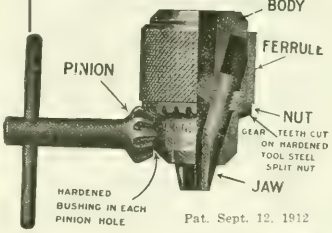


ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



Geared Nut Drill Chucks, in various capacities, 0" to 1".



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English Readings, 1", 2" and 3".

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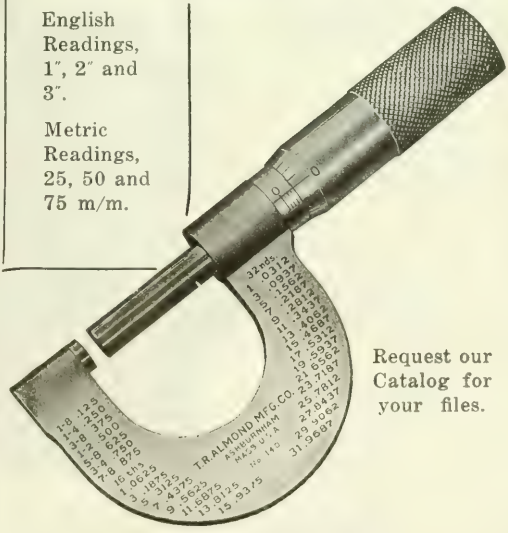

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HORIZONTAL VERTICAL

EVERY working part of this machine is built with a view to **increased production.**

CONTINUOUS MILLING

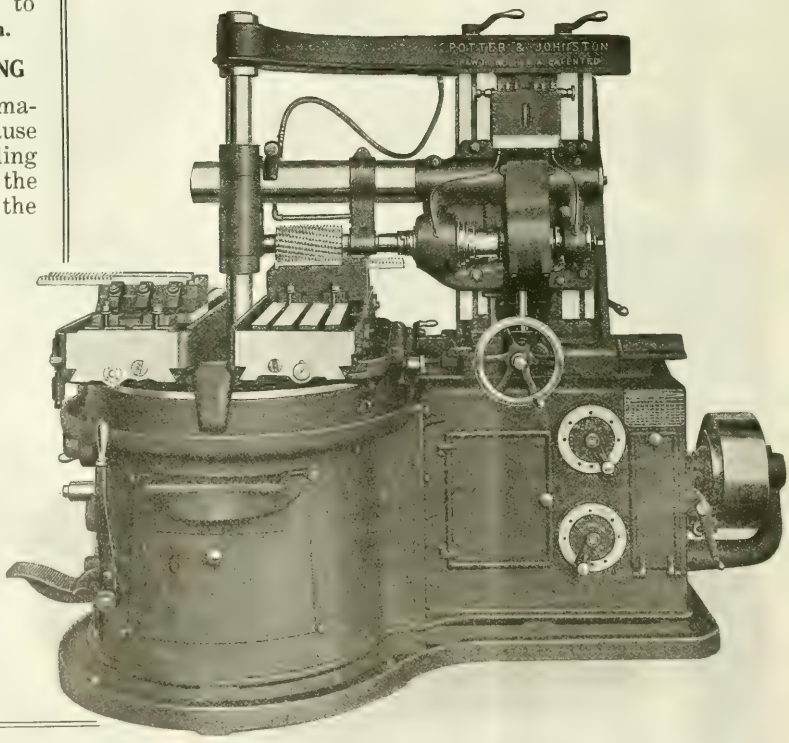
No lost time due to machine idleness because the operator is loading one fixture while the cutter operates on the other.

16 Table Feeds, 7/8 in. to 12 5-16 in.

Length of Table Feed, 28 inches. 12 Spindle Feeds, 20 to 180 R.P.M.

Send us your Blueprints and we'll gladly give you production figures.

Bulletin 36 on application.



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HAVE you noticed the Consolidated Clamp Connection on all Consolidated Presses? Grips like a vise and stays put, one of the bull-dog kind, which, when properly tightened, will not break away, or slip.

If you break it we will furnish a new one free of charge.

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H & G

Die Head Cuts
Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel

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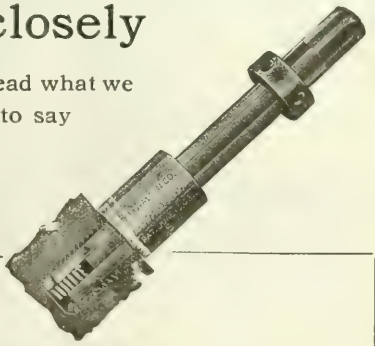
Eastern Machine Screw Corp.

New Haven - Conn.

Look at this again —closely

and read what we have to say below

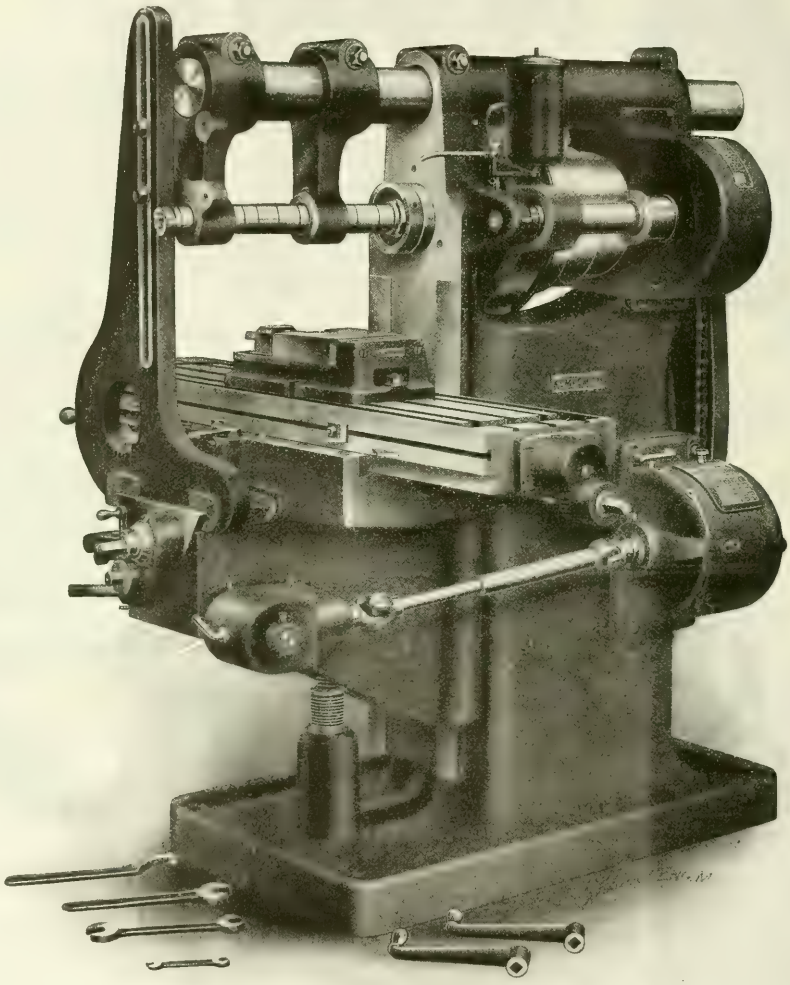


WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.

Don't you think it would pay to have a few lying around on your benches?

The Walton Company
Hartford, Conn.

KEMPSMITH



KEMPSMITH No. 3 Plain Milling Machine

Double Back Geared.

A heavy, powerful tool with double back gears and wide driving belt running on a three-step cone of large diameter. Our Catalogue "B" describes and illustrates many notable features of the Kempsmith Miller. Write for a copy to-day.

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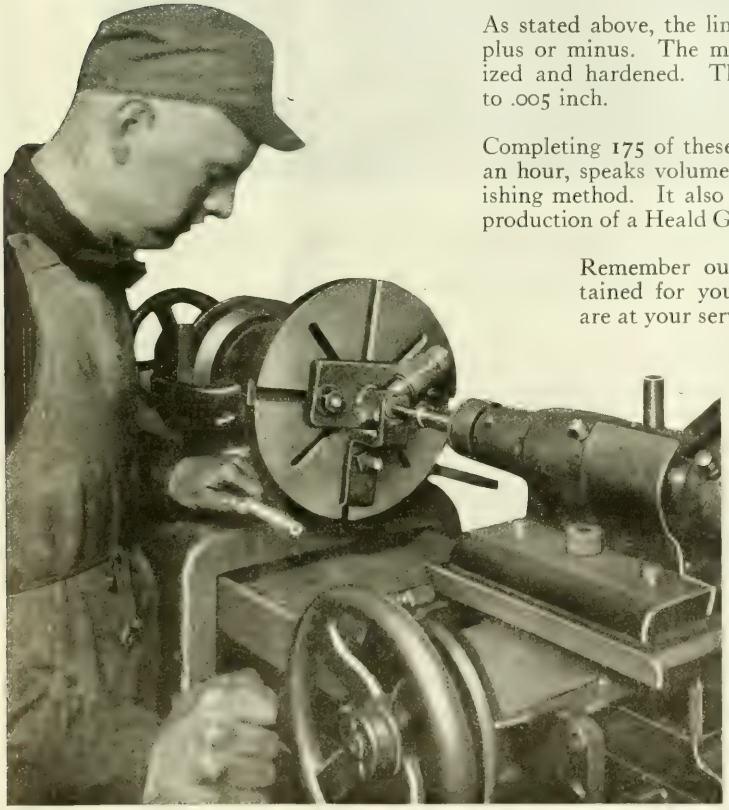
HEALD

Limits of Accuracy .0005 in. On Steering Knuckle "T" Heads

Yet a HEALD No. 75 Grinder Turns Out 20 an Hour

The illustration below shows a Heald No. 75 Internal Grinding Machine rough and finish grinding one-inch holes 1¾ inches long in a Steering Knuckle "T" Head at the Anderson Electric Car Co., Detroit.



As stated above, the limits of accuracy are .0005 inch, plus or minus. The material is steel forging, carbonized and hardened. The stock removed is from .003 to .005 inch.

Completing 175 of these pieces a day, at the rate of 20 an hour, speaks volumes for grinding as a modern finishing method. It also demonstrates the accuracy and production of a Heald Grinder.

Remember our service department is maintained for your convenience. Our engineers are at your service.

"Dependability First"

THE HEALD MACHINE COMPANY

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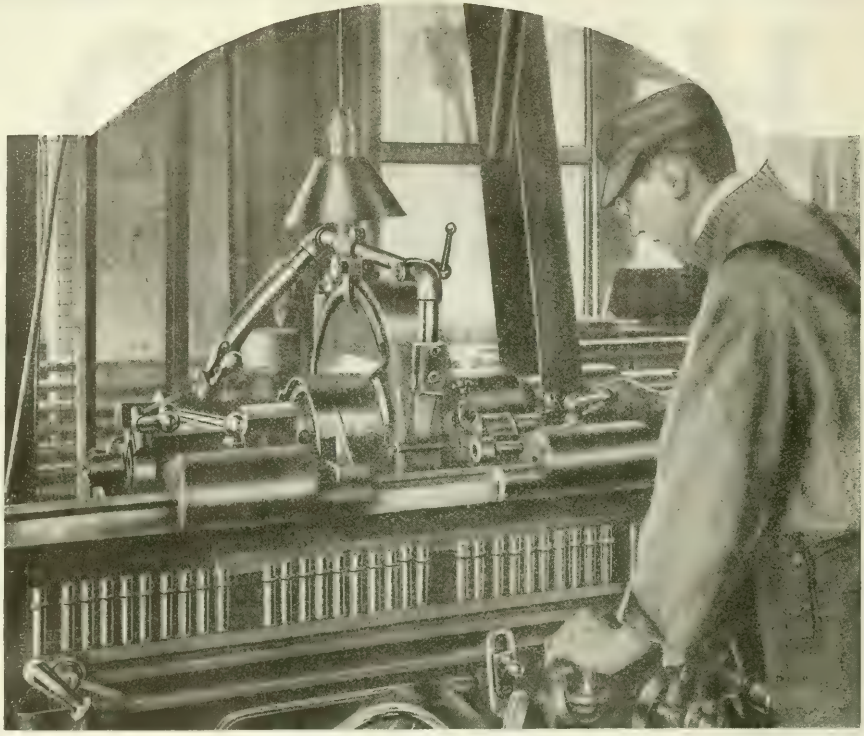

How's this for Grinding Valve Guides?

150 Finished within 0.0005 in. Every 9 Hours

Getting tip-top results from his Norton Grinding Machine is this operator's delight. He knows he has a machine which will turn out work with the highest degree of accuracy and it's his chief joy to show the other fellows in the shop just what *good work* he can do on his "Norton."

When this picture was taken he was grinding cast iron valve guides—removing 0.018 in. stock with a tolerance of 0.0005 in.—and completing 150 guides every nine hours. A pretty good record! The machine he operates is a 10 x 36-inch Norton Grinding Machine, seven years in constant service, with only a little attention to the bearings as all the repairs in that time.

Service—both as to production and long life — are "built-in" features of Norton Machines. Have you considered their possibilities on your work? Write us, enclosing prints of your work; perhaps we can help you.

Norton Grinding Company - Worcester, Mass.

Chicago Store: 11 N. Jefferson Street

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THINK IT OVER.

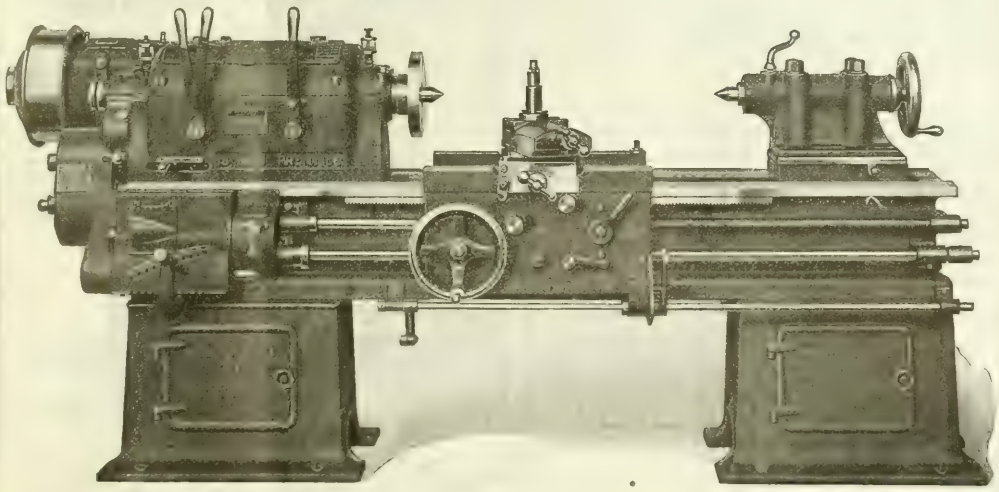
IF EVERY TIME YOU WANTED TO "CHANGE GEARS" ON AN AUTOMOBILE YOU FOUND IT NECESSARY TO MOVE FROM YOUR SEAT AND WITH YOUR HANDS, OR A STICK, SHIFT A BELT TO ANOTHER CONE—HOW LONG WOULD YOU PUT UP WITH IT?

THIS "PRENTICE" GEARED HEAD OFFERS YOU THE MODERN TIME-SAVING WAY OF CHANGING SPEEDS ON LATHES.

BESIDES BEING CONVENIENT IT SAVES BELTING BILLS, NON-PRODUCTIVE LABOR, POWER, WASTE MOVEMENTS, INJURY TO WORKMEN, FLOOR SPACE AND OIL.

THINK IT OVER.

CANADIAN FAIRBANKS-MORSE CO., LTD.
MANNING, MAXWELL & MOORE, INC.
FENWICK FRERES



Notes on Grinding
NORTON COMPANY, WORCESTER, MASS.

No. 42A

Keeping the Wheel in Condition for Knife Grinding

The usual method of dressing the grinding wheel is by means of a Crystolon stick. The wheel face is touched lightly from time to time, the frequency depending upon the action of the wheel in use. The grinding wheel face is thus sharpened, or in other words, the dull grains are removed and new sharp, abrasive particles are presented, which in turn give more satisfactory results. It is possible also for a skillful operator to restore the shape of the wheel face with one of these Crystolon sticks.

One of the greatest objections to some of the old types of knife-grinding machines was the use of a wheel with too small a diameter. Each shop or mill usually has a certain standard length of bevel, depending upon the wood to be cut, which is measured by a gauge, and the knives must be ground accordingly. When the grinding wheel has worn an inch or more in size, the bevel produced on the knives naturally became so concaved as to weaken the cutting edge considerably. This condition is being eliminated in the modern machines through the use of larger wheels.

On the modern knife-grinding machines 30 or 36, grades J or K, Alundum, vitrified or silicate wheels will be found almost universally satisfactory. The grain and grade depends somewhat on the size of the wheel. Very little dressing is required, and a cool, rapid-cutting action is given, with a reasonable feed and traverse. Occasionally it is necessary to use wheels as soft as grade I or even H, but this is unusual.

NORTON COMPANY

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

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P H
TRADE MARK

What Do YOU Want in a File?

You want it to be hard and straight, quick cutting and long wearing.

All these qualities are embodied in P.H. and IMPERIAL FILES.

The highest grade of Best Clay Crucible Cast Steel, expert workmanship, and scrupulous inspection guarantee to you that

"THEY CUT FASTER AND WEAR LONGER"

Specify them on your next requisition. Your money back if they don't live up to your expectations in every way.

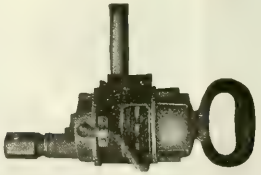
Ingersoll File Company, Limited
INGERSOLL - ONTARIO

John Morrow Screw & Nut Co., Ltd.
INGERSOLL, - - - ONT.
Sole Distributors

IMPERIAL
TRADE MARK

U. S. Electric Drills and Grinders

Save Time. Labor and Money



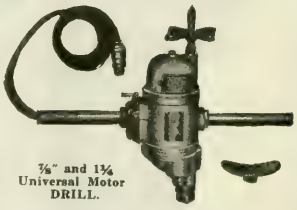
They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

3 SIZES
3-16 in., W.G.T., 6 lbs.
¼ in., W.G.T. 9 lbs
⅜ in., W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.
Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



⅜" and 1¼ Universal Motor DRILL.

For Sale By
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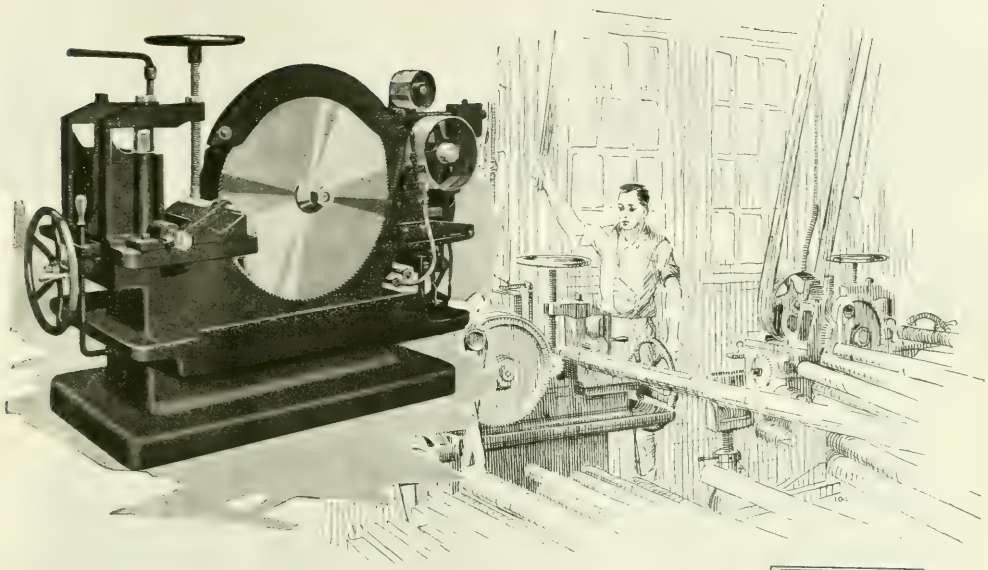
THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO



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Cutting Off Machines
Saw Sharpeners
GTD

The use of Nutter & Barnes Automatic Metal Cutting-Off Saw Machines in the steel shed effect a real economy in steel.

These machines fully described in Machine Tool Catalog No. 39

Got yours?

These high-powered machines drive an exceptionally small, narrow saw, considering their capacity. Consequently the wastage of steel is reduced to a minimum.

On the other hand, they are big producers. Nutter & Barnes Cold Saws are used by some of the largest shops in the world. *They can help you!*

GTD

MACHINE TOOL DIVISION

Greenfield Tap and Die Corporation

GREENFIELD, MASSACHUSETTS

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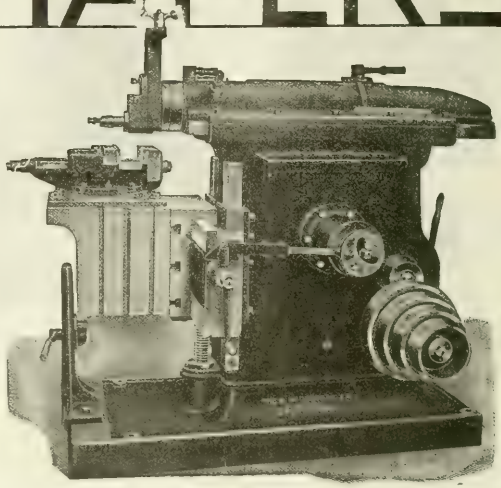
Simple Design and Convenience of Adjustments

give operator every facility for ease of operation and Accuracy in Production

Our circulars, containing complete specifications and descriptions, are ready. Write us for one.



The R. McDougall Co., Limited
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MARK YOUR PRODUCTS THE "MATTHEWS" WAY

"Matthews-made" steel stamps and lettering dies make easily read and durable marks on all classes of products. Matthews Champion Type Holders—for flat and convex surfaces—with interchangeable Steel Type, save time and lower marking costs. Matthews Inspection Hammers of best Pittsburgh Steel, are fashioned with the "know how" of over 50 years' experience.

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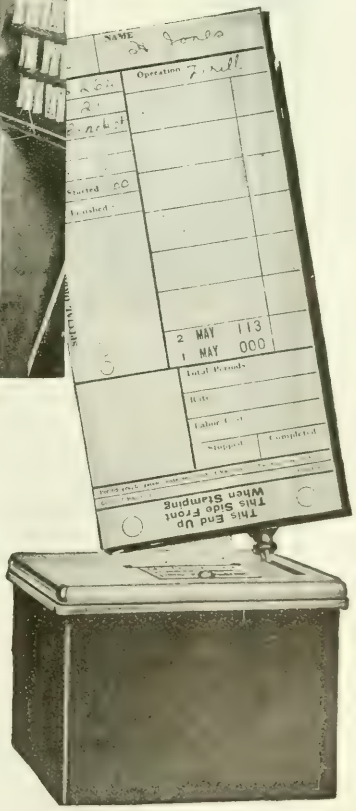

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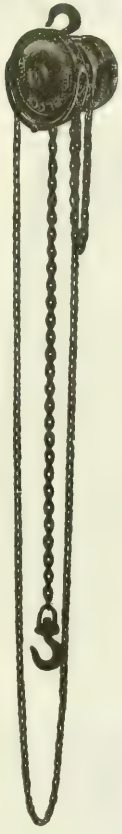

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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 16. April 17, 1919.

Thread-Cutting and Spindle-Boring Tools

An Article Describing How Standard Lathes, With Certain Additions, Are Used For Important Threading and Boring Operations, the Design of Thread-cutting Lathe Being Especially Noteworthy

By J. H. MOORE, Associate Editor, Canadian Machinery

TO utilize a regular lathe for precision thread cutting seems a dangerous thing to do, yet this is what the Canada Machinery Corporation of Galt has accomplished, in fact one might say has perfected for some time past, as it is now nine years since the lathe shown at Fig. 1 was first operated for such special purpose. It is in the belief that readers would like to hear the story, and find out how such a change was accomplished, that the following article was written.

As is already well known, this firm spoken of manufacture a line of lathes, of all sizes, each of course requiring a lead screw. It was in order to be sure of the accuracy of these screws that the lathe (Fig. 1) was converted into a special precision thread cutting lathe. To illustrate to the reader the capacity, general changes to the regular machine, and other details of importance, we will follow up in sequence, first the headstock, coming down the lathe by gradual steps, after which a general summary of results will be given.

First the headstock. This portion of the lathe remains unchanged, except that it has an extra large hole through spindle, the gearing leading to the screw being simple gearing only, these gears of lead of the thread to be cut. The chuck used on the main spindle is of split jaw construction, a ring with 4 grooves, together with the usual style wrench doing the tightening.

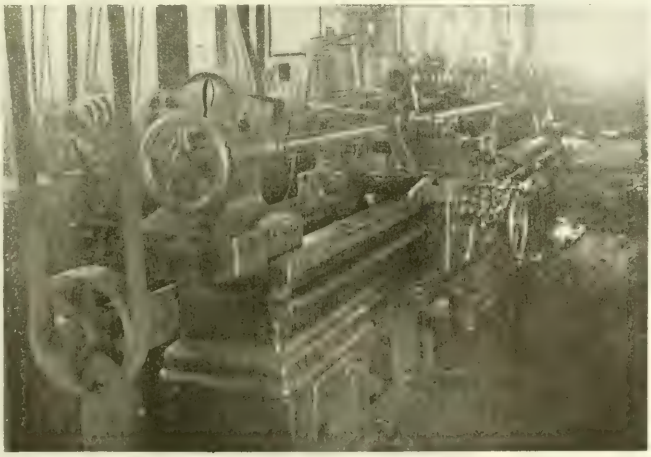


FIG. 1 GENERAL VIEW OF THE LATHE

Attached to the back of the lathe bed are two brackets, one of which is shown at "A." These brackets carry a special coarse pitch screw which is used for quick return purposes, and is connected by means of a special split nut at back, to the saddle, allowing same when thrown into place to return at a greatly increased rate of speed. Attached to the right hand end of this screw, or quick return shaft as it might be called, is a pulley plainly seen on the photograph, which drives this shaft, entirely separate from the other mechanism of the lathe.

The tailstock is of regular construction, and when the screw to be cut is of more than usual length, the tailstock is taken entirely out of place, in order to allow the screw to stick out past the length of the bed. Of course for the first 8 feet of thread cut, the tailstock is kept in place.

Purposely the mention of saddle has been left to the last, for this is the most important part of the whole machine. To clearly illustrate this portion a separate view was taken, shown at Fig. 2.

It can at once be noticed, that here is a saddle not only of special, heavy construction, with rigid design, but of very novel construction. The portions A and B are two lugs, having removable bushings, which act as steady rests, these being changed to suit the size of screw being threaded, and are held in place by two set screws noticed on photograph. Two tools are placed on this carriage; each being held rigidly in position, by clamps and screws. For roughing, both tools are used, while for finishing only one tool is utilized.

To adjust the tools very accurately, the two knurled knobs C and D are used, each knob operating its particular tool. The large lever E operates out and in quickly these cutting tools already spoken of. Before cutting these screws, the spline is previously milled in another operation.

To gauge work correctly, a split nut about 4 in. long is used. This nut is fastened over the screw by means of two cap screws, and a sketch at Fig. 3 shown to illustrate its general construction. All screws cut on the lathe, must conform to their particular size gauge nut, before being considered OK.

The capacity of this machine is as follows:

Machine will cut from 1 in. to 5 pitch, and screws as long as 36 ft. have been cut on this machine with success. In fact any length screw can be cut, the only point being the supporting of same, and the fact that only 8 ft. of thread can be cut at a time. The machine has been nine years in operation, and during that time has cut over 2,000 screws varying in length from 8 ft. to 36 ft. with great accuracy, in fact at present it is cutting screws, with just as much accuracy as formerly, a record to be proud of, and one that speaks well for the class of workmanship put into the manufacture of this machine, which is really one of the regular design, only with a few added attachments for the special work.

Special Boring Lathes

Another machine of particular interest in this plant, is that of a special spindle boring lathe, shown at Fig. 4. Some parts of this machine are regular lathe parts, but in its present form it accomplishes the important operation of boring out the lathe spindles as manufactured throughout the plant.

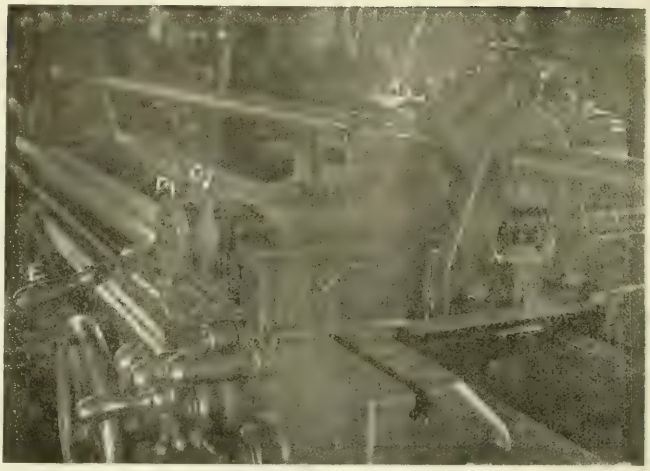


FIG. 2 CLOSE UP VIEW OF THE CARRIAGE

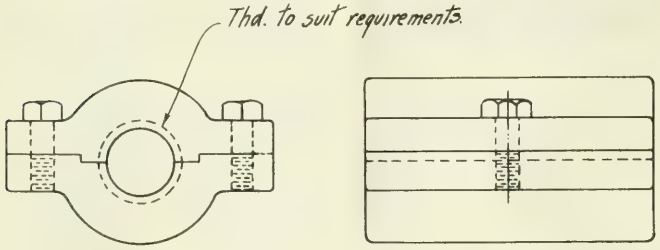


FIG. 3.
SKETCH OF GAUGE NUT

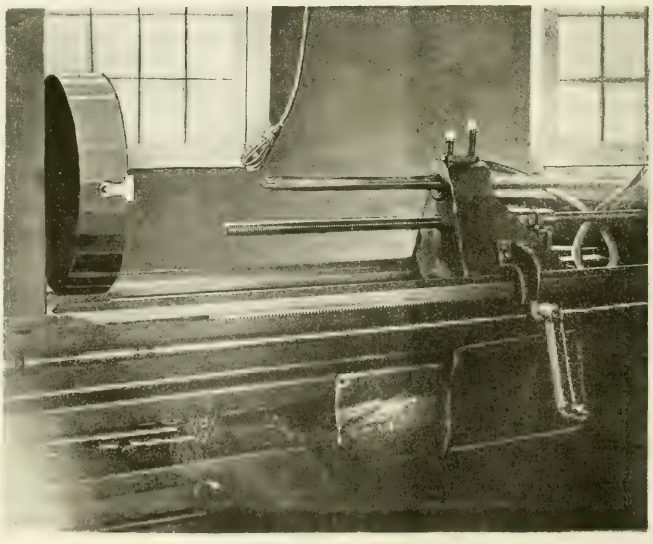
First the headstock is of very short construction, and the spindle to be bored being held inside of the spindle. The chuck is an ordinary 4 jawed independent type. A special carriage A was made, and its general construction can be clearly noted on the photo. The screw B is a permanent fixture on the machine, and continues through to the rear of the machine, and geared down by simple gearing to the lathe feed screw.

Supporting this screw at the back of lathe is the rest C. When in operation, the saddle is fed from the lathe feed screw, up through the gears, on to screw B, which of course by means of the nut D moves the saddle forward at the desired speed.

The drill itself, E, is of flat bit construction, having a round shank, which in turn is fluted out for chip clearance.

Running through this shank are two water supply tubes, the hose feeding these tubes being clearly seen on the photograph. If desired, the saddle can be fed by hand, by means of the handle F, together with the pinion engaging with the rack on bed of lathe.

Altogether these two machines spoken of in this article are well worthy of attention, for the work turned out by them is of high standard, and goes to show that by a little ingenuity any special problem can be successfully solved.



GENERAL VIEW OF THE MACHINE

The best form of charcoal for use in gas masks as an absorbent was derived from cocoanut shells and fruit stones. This charcoal was highly absorbent and was well adapted for impregnation with the various chemicals used. The industry grew so rapidly that one plant had a storage capacity of 5,000 tons under cover and 15,000 tons in the open.

Methods of Mounting Motors on Ceilings

By Mounting Motors Near the Ceiling or in the Roof Trusses Valuable Space is Saved and Economies Effected in Transmission Where Group Drive is Employed

By RALPH G. BRADSHAW

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IT very often occurs that the most desirable location for a motor for a group drive is at or near the ceiling of the room. In such a location the motor does not occupy valuable floor space, and is immune from meddling by the unauthorized. There are two possible objections to such a location. One is that the space near the ceiling is always the hottest part of the room, which is undesirable, because a motor placed in such a location may become unduly overheated. The other objection is that unless proper provisions are made, a motor near a ceiling may be difficult to inspect and repair. The last objection can be nullified, provided proper ladders and platforms are installed, from which the inspector can work.

Where a small motor is to be placed it can be bolted, inverted, directly against the ceiling. Timbers can be secured against the ceiling, into which lag bolts, passing through the bolt holes in the motor frame, can turn. Lag bolts should, however, never be used to support a motor, hence the preferable and only dependable method of supporting a motor at or near the ceiling is to fix the supporting bolts so that they will pass entirely through the floor. The most effective way to raise an inverted motor to a position against the ceiling is to thread two lines or falls through diagonally opposite holes bored through the ceiling, as above suggested. In boring these holes care must be taken to place them so that they will exactly fit over the holes in the motor frame. The lines are passed through from the storey above to the floor of the room below. The motor to be mounted is turned upside down on the floor, and each of the two lines is threaded through a bolt hole in the motor frame corresponding in position to the hole in the ceiling above through which the line passes. Then a knot is tied in the line below the motor frame so that when the lines are pulled on the knots will sustain the weight of the motor. Then helpers on the storey above pull on the lines and draw the motor in position against the ceiling. Bolts are inserted through the remaining holes in the floor and through the motor bed plate and the nuts are set up on these bolts, holding the bed plate firmly in position. Then the lines are removed and supporting bolts are pushed through the holes in the floor from which the lines have been taken and through the motor bed plate, and their nuts turned up on them.

With larger motors it is necessary to build a shelf or platform upon which the motor may rest and upon which the inspector may stand while cleaning and adjusting the machine. Fig. 1 shows a simple motor platform that has been found very satisfactory in practice. A number of supports similar to this were used in the Omaha shops of the Union Pacific Railway. Group drive motors of outputs in the neighborhood of 20 h.p. were mounted on the platforms. It will be noted (Fig. 1) that all of the platforms were arranged along the side of the building, so that a 6x8 in. timber held to the brick wall with ⅞-in. bolts formed a support for one edge of the platform. An 8x8 in. timber formed a beam carrying the outer edge of the platform. This timber was in each case

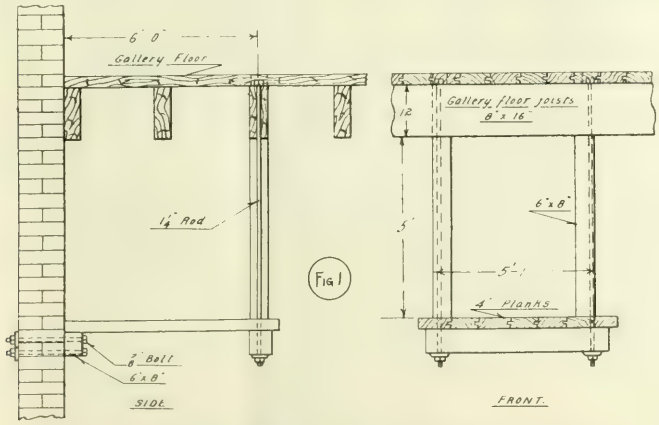


FIG. 1. MOTOR SHELF SUPPORTED FROM CEILING AND WALL

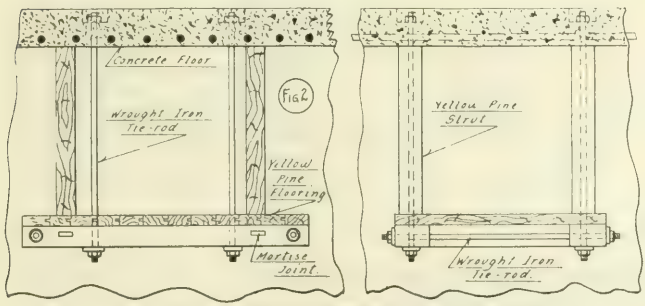


FIG. 2. MOTOR SHELF SUPPORTED FROM CONCRETE CEILING

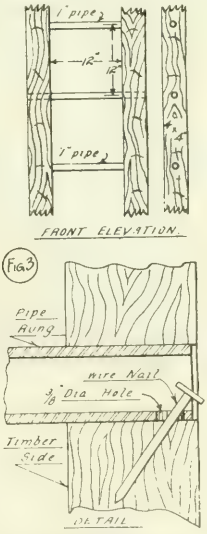


FIG. 3. CONSTRUCTION OF A LADDER WITH PIPE RUNGS

held from the floor above by two $1\frac{1}{4}$-in. tie rods that passed vertically entirely through 8x16 floor joists. Care was taken to so locate the motor platforms that the tie rods would, in every case, pass through holes in the floor joists, because the holes in the joists in which the tie rods snugly fitted provided lateral support for the platform structure and tended to minimize vibration. A 6x8 strut was clamped in at the side of each tie rod between the platform floor and the gallery floor joists. A slot was cut in the side of each of these struts for the accommodation of the tie rod, which maintained each strut in its correct position.

A platform that has been successfully used for supporting motors to ceilings in reinforced concrete buildings is shown in Fig. 2. The tie rods pass, as they should in every case, entirely through the floor, so that they will be substantially supported from above. The timbers comprising the frame upon which the floor is laid are mortised and tenoned and are held together with iron tie rods, eliminating any possibility of the shaking asunder of the frame. Where there is a considerable side pull occasioned by a belt drive from a motor platform, it may be necessary to install braces for a platform like that shown in Fig. 2, to prevent the platform from being pulled out of its position laterally. Ordinarily, however, such braces are not necessary if the platform is well constructed and the nuts of the tie rods are set up snugly.

It is, however, essential that a good ladder, or some other means of access, be provided to every motor platform. If it is difficult for the inspector to reach the platform, the motor will probably not receive the attention that it should. A splendid form of ladder that will not wear out, and which can be readily constructed is shown in Fig. 3. The side pieces are 4x4 timbers and the rungs are 20-in. lengths of 1-in. pipe. Pipe that can not be used for any other purpose, because it is rusted, or cracked, can be utilized for rungs of a ladder of this type. The 12-in. distance between centres of rungs provides a convenient spacing, but this can be increased or decreased in accordance with the practice prevailing in the plant where the ladder is installed. The holes through the 4x4 timbers for the reception of the pipe should be so bored that the pipe will fit into them very snugly, and a nail should be driven, as shown in the detail in Fig. 3, through a hole in the end of each pipe to prevent its turning as a man mounts the ladder. The nails also keep the rungs from slipping sideways out of the timbers. The nails should always be driven in far enough so that they will not extend and cut the fingers of a man using the ladder.

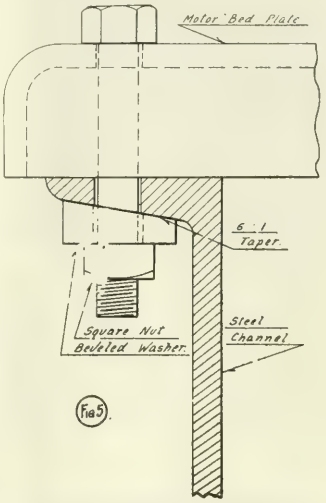


FIG. 5—DETAIL SHOWING HOW BEVELED WASHER IS USED

Ordinarily, ladders about an industrial plant are made with 2 x 4 vertical timbers, and 1 x 4 rungs and such are, of course, cheaper, in first cost at any rate, than the ladder in Fig. 3, but the rungs in wooden ladders wear out, and sometimes they break and injure a man and thereby involve a damage suit. It is for the reason that the pipe rung ladder is always safe and will practically never wear out that it is probably more economical in the long run than a wooden ladder. The pipe rungs can be cut and drilled in the pipe shop at times when the mechanics have no other work to do.

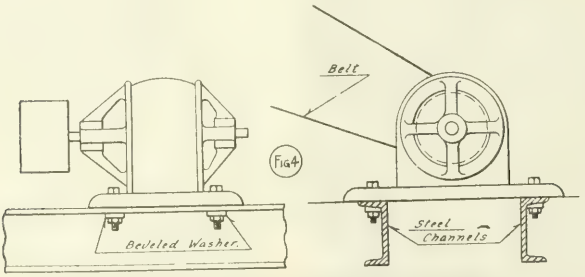


FIG. 4—SMALL MOTOR CLAMPED WITH BEVELLED WASHERS

In modern plants the practice of using structural steel for supporting motors is every day becoming more popular. In some shops wood construction, and, in fact, any construction that is combustible, is not permitted.

Structural steel is used instead and provides a permanent, rigid, and fireproof frame for the motor platforms. Small motors can be conveniently mounted on a couple of channels, as suggested in Fig. 4. The holding-down bolts of the motor pass through holes in the channel flanges and are held therein by nuts turned on at the lower ends of the bolts. Inasmuch as the sloping surfaces of channels and I-beams always slant with a 6 to 1 pitch, it is necessary to insert so-called beveled washers between the holding-down bolt nut and the flange face, as shown in Fig. 5, so that the nut will have a horizontal surface upon which to slide. Fig. 7, in connection with Table I, shows dimensions of beveled washers for use with I-beams and channels that have been found satisfactory in practice. It is not usually possible, so far as the writer is aware, to obtain these beveled washers on the open market. They can sometimes be secured from the structural steel companies, but if many are to be used it will pay any concern to make a pattern like that shown in Fig. 6 and have the washers cast at the nearest foundry. It will be noted that in the pattern of Fig. 6 a deep groove is cut between adjacent washers. A strip of a half dozen or more washers is cast from one pattern and then the washers can be broken off along the grooves as they are required.

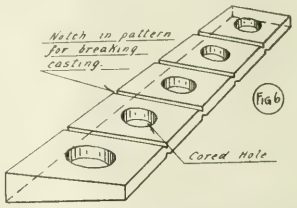


FIG. 6 METHOD OF CASTING CHANNEL WASHERS

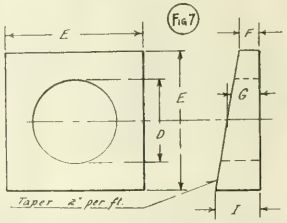


FIG. 7—CAST IRON BEVELED WASHER

With larger motors, it is not feasible or desirable to bolt them directly to the flanges of steel sections as shown in Fig. 4. The disadvantage of this Fig. 4 method is that the holes must be drilled accurately in the channel or I-beam

flanges for the accommodation of the holding-down bolts, and furthermore, that after the holes have been drilled only one position of the motor is possible. The arrangement of Figs. 8 and 9, wherein cast iron channel washers, Fig. 10, are used for clamping the structural steel members together, eliminates both of these disadvantages. No drilling is required in the channels that comprise the supporting frame, and the character of the construction is such that the motor can be readily shifted along the two channels upon which it rests, and these two channels can in turn be shifted along the members upon which they rest, so that the motor can be readily aligned with the pulley which it is to drive.

As suggested in Figs. 8 and 9, two channels are always used to form a supporting beam where the channel washers are utilized. The channel washer has two functions. The first is that it provides a means of clamping the two channels that fit into it to some other member, and the second function is that it maintains these two channels at a given distance from one another. The protection, G, in Fig. 10, maintains the channels at a given distance apart. It is seldom possible to obtain these channel washers on the market, and for this reason Table II is given to show some dimensions that have proven satisfactory in practice. These channel washers can be used for other size sections than those shown in the first column of the table, and also in combination with small I-beams.

No floor is shown in the motor platform in Figs. 8 and 9, because practice differs in regard to floors on structural steel motor supports. Some concerns insist rigidly upon the elimination of wood, in which case floors of standard checkered steel plate can be used. Such floors are, however, of necessity always grounded on the structural steel frame of the building. A man standing on such a floor is, therefore, liable to receive a severe shock. It is for this reason that it is probably usually the best practice to place a wooden floor on a steel platform around the motor, particularly if it is high up in the roof trusses, because if a man fell from such a location it would probably be fatal. The amount of wood in such a floor should be maintained at a minimum.

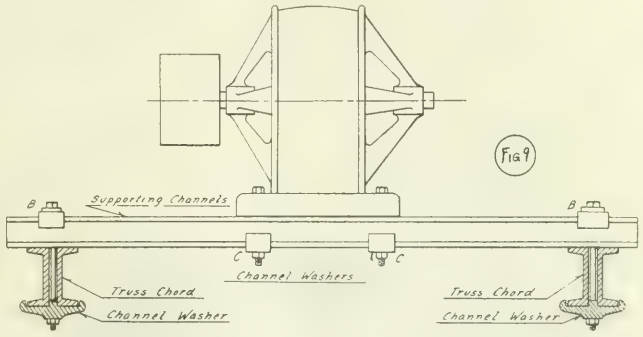


FIG. 9 SECTION A-A OF FIG. 6

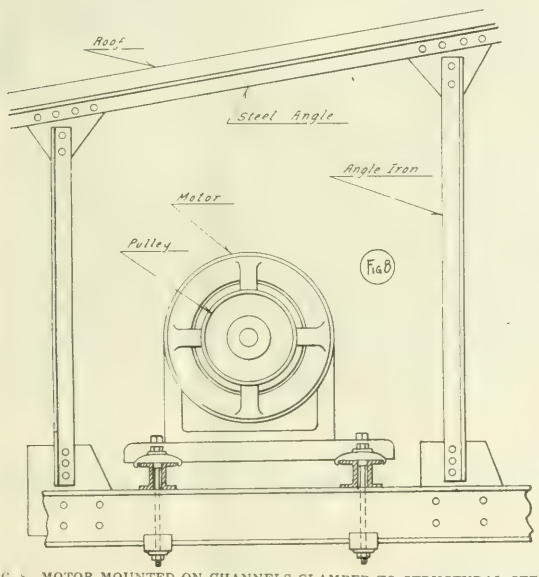


FIG. 8 MOTOR MOUNTED ON CHANNELS CLAMPED TO STRUCTURAL STEEL ROOF TRUSS.

CONVERTING A PIPE THREADING MACHINE INTO A LATHE

By J. M.

The following description as to how we made a pipe-threading machine serve the purpose of a lathe may be old to some of your readers, but on the other hand it may be new to others. We had occasion to use some lengths of 2¼ in. round iron as shafting, the ends of which had to be turned down to 2 in. to fit the couplings, and to suit the supporting bearings the shafting had to be turned down to 2 ins. at various places.

Having no lathe capable of doing the work, resource was had to the pipe-threading machine, and with fairly satisfactory results, notwithstanding that the machine was old and somewhat the worse for wear. The gripping chuck served as a driver, and the guides in the die head supported the shafting just where support was required. Two tools (right and left hand) were made to fit the tool slide rest, where the cutting-off tool usually fits, and by substituting a nut and screw arrangement for the rack and pinion gear we had a very serviceable lathe for the work in hand.

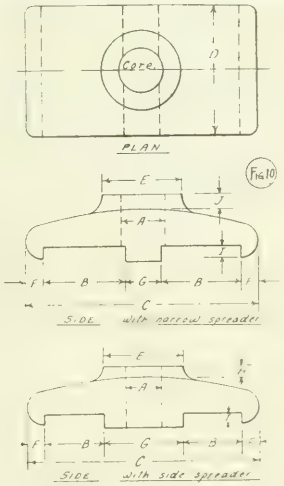


FIG. 10—CAST IRON CHANNEL WASHERS

VANCOUVER.—It is announced that the big Empresses of Japan and Russia, which have been on war duty for four years, have resumed their former route between Vancouver and Yokohama and Hong Kong.

Canadian Machinery Drafting Course---Part II

In This Second Portion We Go Still Further Into the Use of the Drawing Instruments, and Discuss the Various Type of Lines as Adopted in General Drafting Practice

By J. H. MOORE, Associate Editor Canadian Machinery

DRAFTING COURSE, PART 2

BEFORE commencing on the second part of this course, how about the first instalment? Did you study it up and derive any benefit from the same? What is equally important is this: have you sent us in a sample of your work? Remember the three prizes each issue, so get busy, if you have so far neglected at sending your work along, for it might be your plate that will land a prize.

In Part 1 we touched on the very simple uses of the drawing board, T-square, and triangles. Plate No. 1 was simply a test to see if instructions had been followed, so now let us go still further into the various other instruments, as required in the art of mechanical drawing.

The Scale

Fig. 1 illustrates a very popular type of scale as used in drafting work. These scales are usually constructed of boxwood, and are made in a triangular section as shown. Usually they are graduated for a distance of 12 inches. The type illustrated has six surfaces for different graduations, and the scales are so arranged that the drawings may be made in any proportion to the actual size. For general mechanical work the common divisions are multiples of two, thus drawings are made full size, 1-2 size, 1-4 size, 1-8 size, 1-16, etc., etc. Should a drawing be half size of course 6 inches would then equal 1 foot, while if ⅛ scale is desired 1½ inches equals 1 foot. The scale is provided with all these necessary graduations, and the student is advised to study his scale and becomes worn and is not to be depended scales and how to use them, for later on in the course this will become a necessity.

Another very handy scale is the flat type, with beveled edge, but as the divisions on these scales are similar to the triangular type we need not discuss the scales question further. For the present, all drawings will be made full size, so students have ample time to familiarize themselves with the use of their scale.

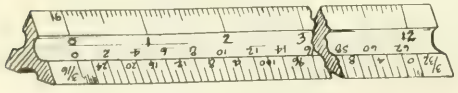


FIG. 1 GENERAL VIEW OF TRIANGULAR SCALE

The Protractor

Fig. 2 illustrates the instrument known as a protractor. This tool is used for laying off and measuring angles and is usually made of steel, brass, celluloid, or sometimes paper, but the latter is not to be recommended, as it soon becomes worn and is not to be depended upon for accuracy. For general use in this course, either of the first three stated will do, with the celluloid the favorite. If made of metal the instrument is cut away as shown in sketch, in order to allow the worker to see his drawing, while if made of celluloid the piece is solid, for the instrument is transparent, a decided advantage over the metal type. In all cases, however, the outer edge is divided into degrees, and tenths of degrees. Perhaps it would be best to sort of jack up readers' minds to the fact that there are 360 degrees in a complete circle, therefore 180 degrees to a half circle. The protractor is laid out in such a manner as to read from 0 to 90 degrees, then reverse, while in some cases both values are stamped on the instrument, as for example, opposite 70 degrees would be also stamped 110, for one would be the component of the other. To prove this in a simple manner for the reader's benefit, let us first take the 70 degree mark. This is 20 degrees less than 90, so in placing the component we must first take the 90 plus the 20, making 110, or the other marking.

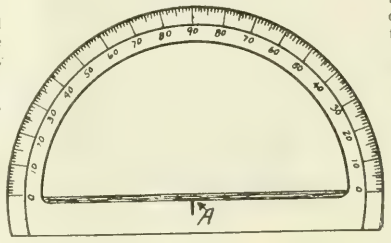


FIG. 2 ONE STYLE OF PROTECTION

FIG. 3 THE IRREGULAR CURVE AND ITS USE

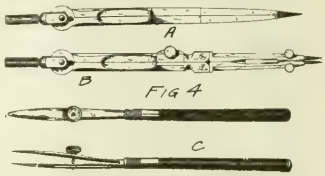


FIG. 4 SOME OF THE VARIOUS INSTRUMENTS USED

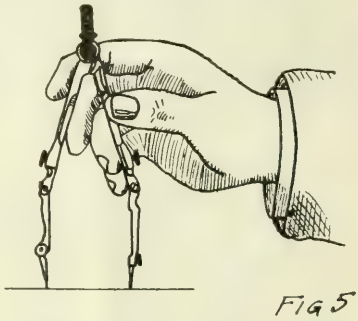


FIG. 5 AN EASY METHOD OF HOLDING THE COMPASS

To lay off a required angle, use a very hard and carefully sharpened pencil. Place the protractor so that the two zero marks are on the given line and the centre point marked A on sketch is at the point through which the desired line is to be drawn. Mark a point at the degree desired, mark your centre point and draw your line, which will then be at the desired angle from the horizontal.

CORRECT AND INCORRECT METHODS OF HOLDING THE RULING PEN

Irregular Curve

Perhaps as convenient a tool as the

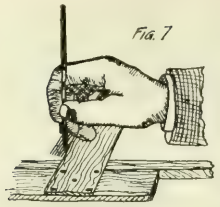


FIG. 7. THE CORRECT WAY TO HOLD THE PEN

draftsman uses is that shown in Fig. 3. This peculiar shaped instrument is sometimes called a French curve, but is generally known as an irregular curve. It is used for drawing curves, other than arcs of a circle, with either pen or pencil. These tools are made of wood, hard rubber or culluloid, and once more the celluloid is the better owing to its transparency. Any curve drawn by such means is usually termed a freehand curve.

To illustrate its use follow the sketch, which forms a part of Fig. 3. Purposely we have shown the dots through which the line has to pass, away larger than the actual thickness of the line, but for illustrative purposes only. In actual practice the line itself would cover and eliminate the dots, showing only a smooth curved line. At all times try and get your curve to pass through at least three dots, or points as they are usually called, for a much smoother curved line will be the result. Usually it is good practice to first pencil the line in lightly, then ink it over. In inking in, it is most important that the blades of the pen be kept tangent with the curve, otherwise there is a tendency to blot the work. Later on in the course, students will find they require to use this tool, but for the present at least, they will not be called upon to use it.

Compass, Dividers and Pen

Fig. 4 illustrates the instruments more used than any others, with, perhaps, the exception of the T-square. At A is shown the dividers, used in laying off distances on the drawing, either from the scale or other parts of the drawing. They are also used to divide a line into equal parts. In fact their use becomes more and more general as the student becomes accustomed to them.

B illustrates the compass, used in drawing circles and arcs of circles. One leg of these compasses has, as readers will notice, a screw which loosens and allows one leg, usually the pencil point, to come out from the lower half, and the pen point or extra length bar to go in its place. By this means the one main body can be used as a pencil compass, or pen compass, simply by interchanging, while by adding the extra length bar, you enlarge the capacity of the instrument, for this bar has also a hole in it to accommodate either the pencil or the pen. From constant practice with this instrument comes a knowledge far better than written instruction can ever give the student. Fig. 5 illustrates about as easy a method of holding the compass as any. Never use both hands, but learn to handle the instruments easily by one hand as shown.

The pen as shown at C illustrates both views clearly, first as it looks from the top, and secondly as it appears from the side when open. This pen is used for drawing straight lines, or curves that are not arcs of circles. Commonly it is simply termed the ruling pen. The distance between the pen points is adjustable by means of a little thumbscrew as

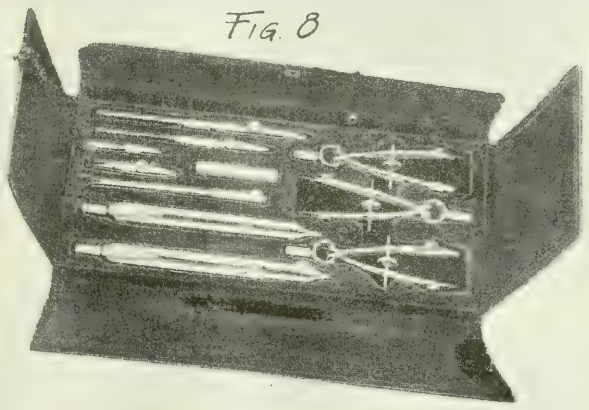
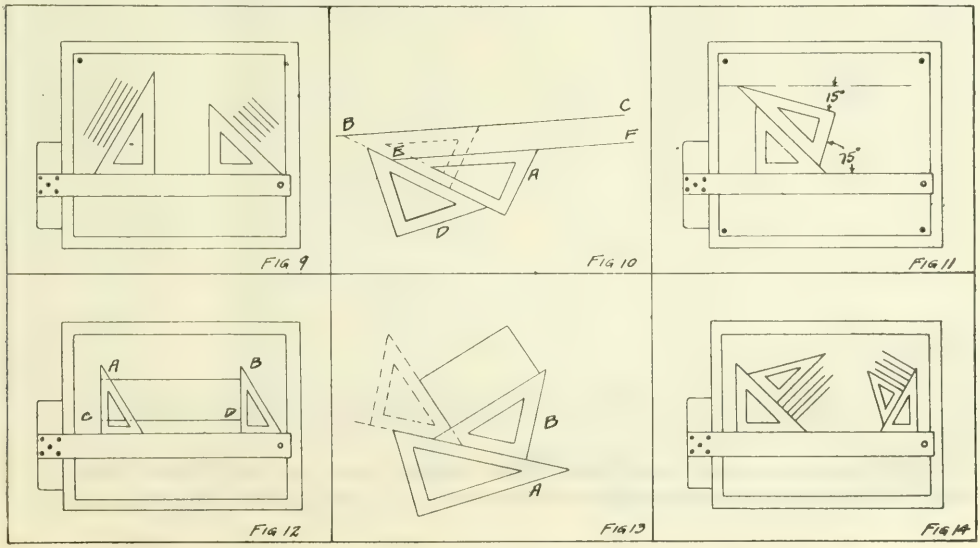


FIG. 8. TYPICAL SET OF INSTRUMENTS



VARIOUS USES FOR THE T-SQUARE AND TRIANGLE

shown. The blades are given a slight curvature, so that there will be a cavity for ink, even when the pen points are very close together. The pen should not be dipped in the ink, but should be filled by means of the quill, which forms a part of the cork on practically all India ink bottles. Do not attempt to place too much ink in the pen at once, about 1-4 to 3-8 in. will be found sufficient. Upon finishing your work always take a cloth and wipe carefully both blades of the pen, as all liquid inks corrode the blades if allowed to dry, and no good work can be done with a poorly kept pen, so students will do well to remember this point throughout the course.

In using the pen be sure that both blades bear evenly on the paper, in order that the resulting line be smooth and even. Study the chart at Fig. 6. A and B illustrate a common danger, namely, first too great a slope outward, and second too great a slope inward. Either one is wrong, and must be avoided if good work is to be obtained. C illustrates the correct method, namely keep your pen blades as vertical as possible. At Fig. 7 is shown another view of using

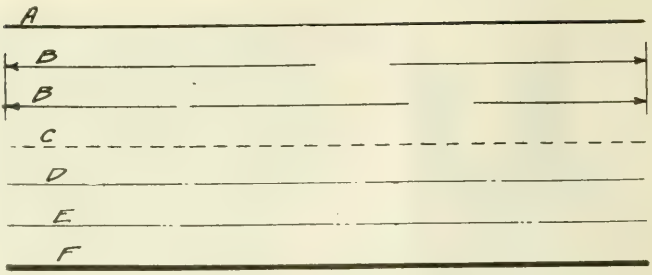
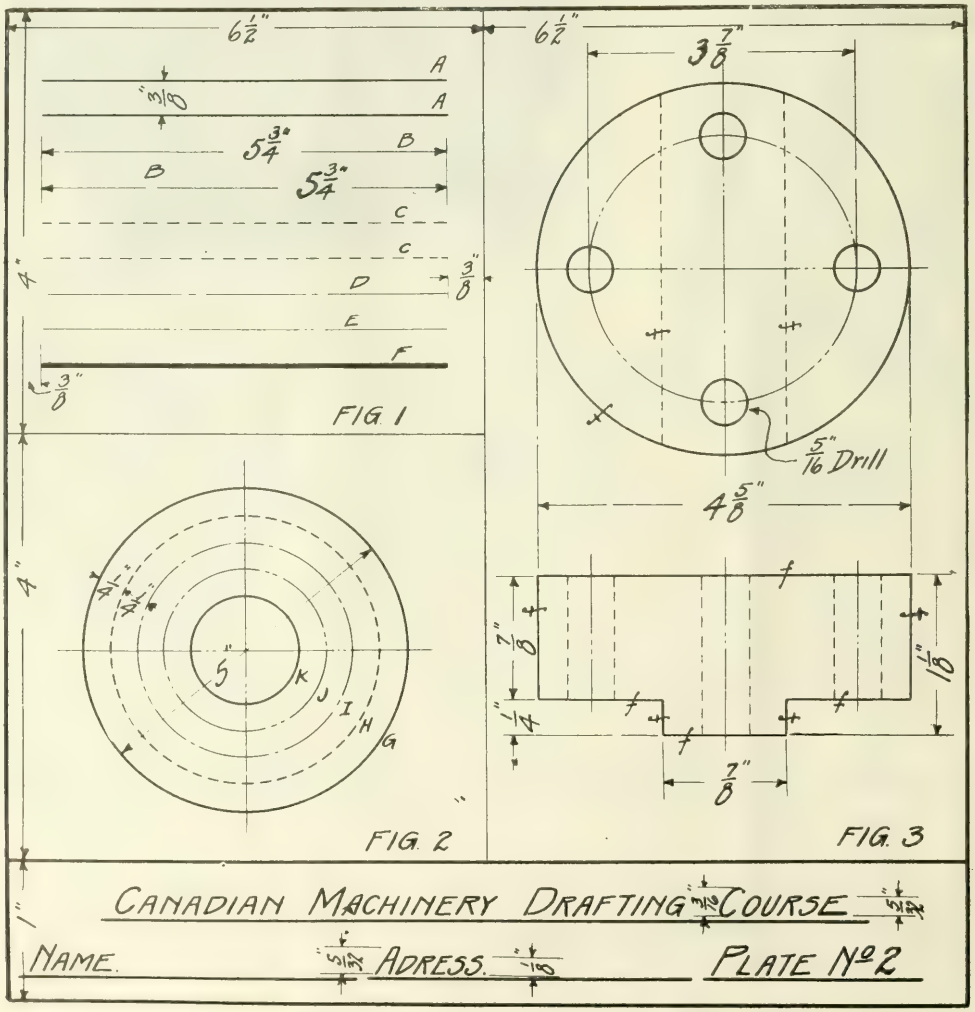


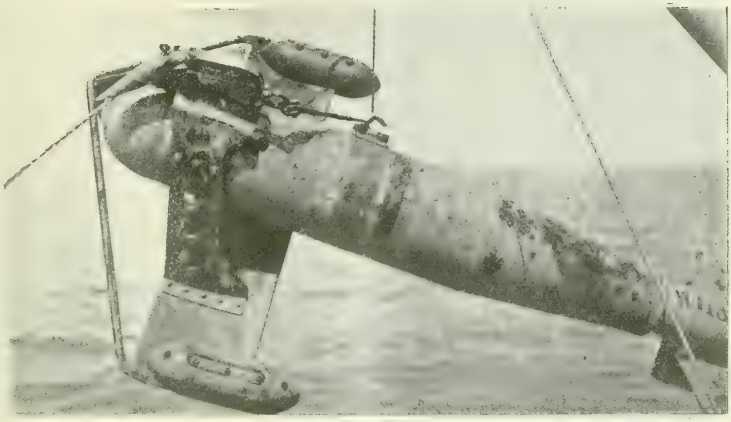
FIG. 15 VARIOUS STYLE LINES AS USUALLY ADOPTED

(Continued on page 382)



The Secrets of the War Coming to the Surface

The Paravane Took the Sting From German Mine



THE PARAVANE READY FOR LAUNCHING

By WILLIAM WASHBURN NUTTING

MANY of the clever devices produced under the stimulus of war are already pretty generally known. Others are not known at all, or else exist merely as names in a strange, new war vocabulary. The tank, for instance, has become a household word, while the paravane, which shares with it the distinction of being the most important of the war's big crop of inventions, is practically unknown.

The paravane or "P.V." or "otter," as it is variously known in the nomenclature of the Allied navies, is the thing that foiled the German mine. Nearly four thousand vessels were equipped with the gear by the British alone, and of this vast number there is no record of the destruction of a single ship by a moored mine. Several hundred American vessels were equipped before the signing of the armistice, and the programme was to have included practically every ship of the Navy and merchant marine. This would have meant an expenditure of ten million dollars (£2,050,000). In saving one of our first-class battleships from destruction, however, the paravane justified itself and the ten million in one stroke.

That some new device had been perfected which permitted Allied ships to traverse mine fields, theoretically deadly, with impunity has long been guessed, says W. W. Nutting, in "International Marine Engineering, but the jealous care with which the secret was guarded kept the details of the gear from the Germans to the last. Many and varied were the explanations of certain odd devices rigged on the bows of an ever-increasing number of naval and merchant vesels, and ludicrous indeed were the stories of the strange winged torpedoes which were likewise carried. This, we believe, is the first time that an authentic description of the device has been published, except in the leaded confidential books of the Navy.

Paravanes and the gear for handling them were perfected during the first two years of the war at the dock yard at Portsmouth, England, and in some quarters they are still known as the Burney gears, after Commander Burney of the British Navy, the inventor. The primary object of the paravane is the protection of ships against moored mines, although there is another type, the mysterious and deadly "Q," which is explosive and which was used with telling results against the submarine. But the protective type is by far the more important. This type is divided into three subdivisions, according to the speed of the vessel on which it is used.

How the Paravane Works

A glance at the diagram will give an idea of how the gear works. A pair of the otters, which act on the same principle as kites, is towed from the forefoot of the vessel. These stand well out forming, with their tough steel towing ropes, a huge wedge. The length of these towing ropes varies somewhat with the length of the vessel, but is, roughly, in the neighborhood of 150 feet. These wires encounter the mooring wire of the mine and deflect the mine, and frequently its mooring as well, clear of the vessel, the mine wire sliding out along the towing rope and into the cutter head of the paravane, where it is severed by serrated steel knives. When the mine rises to surface it is exploded or sunk by gun fire or reported to a patrol vessel.

The body of the otter, which is of steel, is much the same shape as a torpedo, although somewhat shorter. It is watertight and has a positive buoyancy of about ninety pounds, which is sufficient to support half the weight of its towing wire and still bring it to the surface in case the ship stops. A large steel plane, cambered like the wings of an aeroplane is attached as shown in the illustrations. When the otter is in action, this plane assumes a vertical position, pulling the paravane out away from the ship and exerting sufficient tension on the towing rope to deflect the mine. It will be noticed that there are two bulbs on the ends of the plane. One of these is a loaded steel shell, which gives the otter the proper list to cause it to assume quickly its normal position, even when starting from rest. The other is a wooden duplicate of the first, placed there not so much for buoyancy as to make the structure symmetrical and to equalize the steering effect, which would be thrown out of line if the shall alone were used.

Device to Hold Paravane at a Constant Depth

In order to be sure of picking up the mine which is ordinarily moored a couple of fathoms beneath the surface, the paravane must be made to run at a constant depth. This is accomplished by means of a horizontal rudder in the tail, operated by a hydrostatic valve placed in the joint between the tail and the body of the otter. The water pressure acting on the after face of a rubber diaphragm is backed up by a spring on the inside; the compression of this spring may be regulated to cause the otter to maintain any desired depth. When the otter dives, the increased water pressure drives the diaphragm forward, and this motion is transferred to the rudder through a valve stem and a tiller, giving it uphelm. When the otter rises above its set depth, the water pressure falls off and the spring drives the diaphragm aft, imparting down-

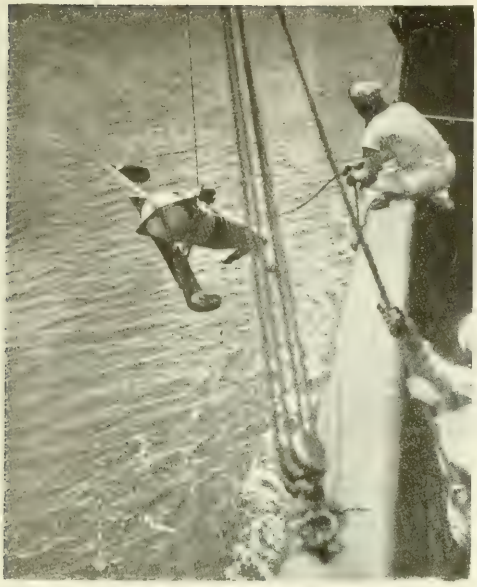


FIG. 2—SWINGING THE PARAVANE OVER THE SIDE

helm to the rudder. Consequently it will be seen that the otter cannot maintain an absolutely constant depth, but must oscillate a bit above and below the average line. It will be seen, too, that this oscillation, or "porpoising," will increase with the speed at which the otter is towed, for the reason that the greater the speed the farther will the paravane rise or sink before the hydrostatic valve has a chance to act upon the rudder.

The Action of the Mercury Oscillator

This excessive porpoising at high speeds prevents the use of the simple type of paravane just described on ships of greater speed than sixteen knots, but this, of course, would include the great majority of merchant vessels. For use on ships of greater speed, such as liners, battleships, cruisers, and the like, it was necessary to equip the otter with some sort of stabilizing device which would perform the same function as the pendulum in a torpedo. The device used—called a "mercury oscillator"—is a 6-foot tube of mercury with a diaphragm at either end through which the valve stem of the hydrostatic valve extends. This tube occupies a position between the spring and the diaphragm of the hydrostatic valve. Its own diaphragms are attached to the valve stem, imparting their effect with that of the spring and the water diaphragm.

As soon as the otter starts to dive or to rise, the head of mercury thus created causes a pressure on one or the other of the diaphragms, which, in turn, transfers it to the valve stem and thence to the rudder. This device is merely an addition to the hydrostatic valve, which works, as in the slower types, to keep the otter at approximately the right depth. The oscillator merely prevents porpoising and permits the towing of the otter at high speed. Two types are equipped with the oscillator, one for extreme speeds, such as would be attained by the destroyers and battle cruisers, and the other for intermediate speeds, such as are attained by battleships.

Towing Devices

It is obvious that, in order to protect the ship thoroughly, the otter must run at a depth not less than the draft of the vessel and that the towing point at the stem must be as low as possible. Mines are ordinarily moored a couple of fathoms below the surface. If a vessel were pitching, however, it might go over a mine unless the point of attachment of the wires was placed low. It is obvious, likewise, that the point of tow must be as far forward as possible in order not to leave any considerable portion of the bow unprotected.

The Sliding Shoe

To get the towing point as near as possible to the intersection of the stem and keel line was a problem. On ships with a deep forefoot, that is, ships which are not cut away much below the water forward, it was simple enough to lower a horseshoe-shaped forging, with the towing wires made fast to either arm, down the stem. All the gear needed was a topping lift and a couple of backhauls to hold the "sliding shoe," as it was called, in place.

This was the method used on all the new vessels of the Emergency Fleet Corporation, since it was an easy matter to build out the forefoot with a "stem extension" while the vessel was under construction. But it would have been necessary to have equipped hundreds of vessels of all types—naval vessels as well as those of the merchant marine—(and most ships, especially large, high-speed vessels, are cut away to too great an extent to permit the use of the sliding shoe)—since it would not have been practicable to build in the entire cut away portion with a skeg. And so two other towing devices were perfected, one called the "boom" type, for slow merchant ships, and the other called the "clump and chains," for naval vessels and the larger, faster ships.

The Boom

Since the boom is an unwieldy piece of furniture, weighing in the neighborhood of a couple of tons, it was only used on the slower types of freighters. It is a built-up affair of forgings connected by a length of pipe and is trunnioned on the starboard side of the ship somewhat abaft the stem and a little above the waterline. The boom is so shaped that when lowered the towing point comes directly under the forefoot. A large clip on the boom engages the stem, holding it in position.

Theoretically, this arrangement is good. It is not a pleasant thing, however, to handle in a seaway and requires a lot of gear—a topping lift over the stem head, with which the boom is raised; a control lift by which it

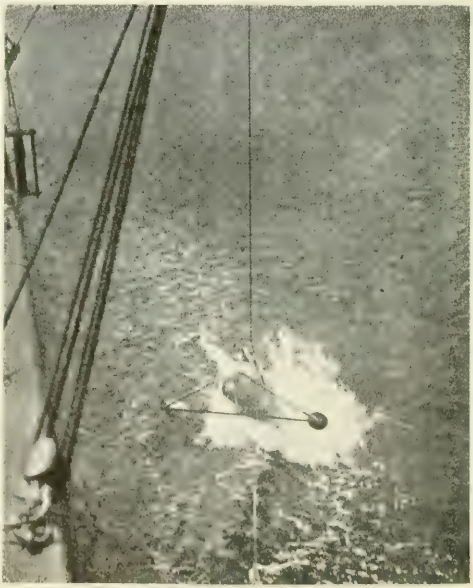


FIG. 3—LAUNCHING THE PARAVANE

is swung around to the rail, where it is secured with chains when not in use, and a backhaul extending from the clip to a point aft on the port side. This backhaul is used to guide the boom and prevent its slatting about while it is being lowered.

On large, fast vessels it is impossible to get the towing point exactly where it should be. The forefoot is usually cut away, prohibiting the use of the sliding shoe, and a

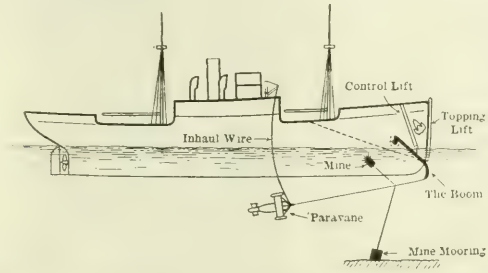


FIG. 4 OPERATION OF THE PARAVANE WHEN TOWING ROPE IS HELD BY A BOOM

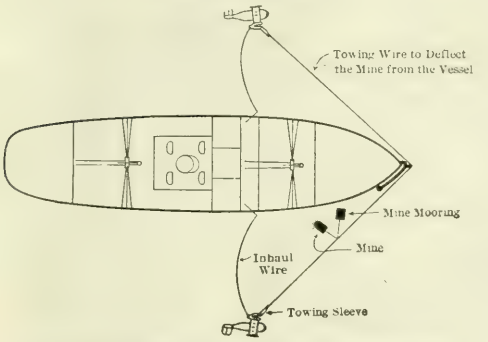


FIG. 5 DIAGRAM SHOWING ACTION OF PARAVANES

boom of the size which would be required would be out of the question. So a skeg, or "clump," is built onto the keel as low as possible without cutting the base line. Through two large holes in this skeg two chains are riven, extending from one rail to the other. These chains are run over the bow chocks and each carries a "dumbbell" and swivel link, to which one of the towing wires is attached. The towing points are lowered by hauling in on the other ends of the chains. By attaching the ends of the chains to a single tailing wire, they may be lowered simultaneously without difficulty.

The position of this skeg or clump is important. In order to prevent the possibility of the towing wires going over the mine, allowing it to come into contact with the bottom of the vessel, the skeg must be low down. This means that unless a very large skeg is used, it must be

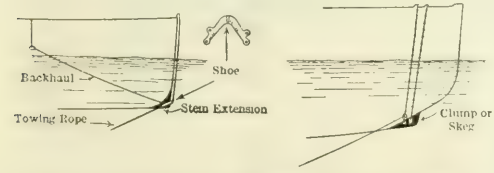


FIG. 6 ATTACHMENT OF TOWING ROPE WITH SHOE AND CLUMP DEVICES

considerably aft to the stem. The placing of the skeg, therefore, is a compromise, for, when in position just mentioned, it leaves a considerable section of the bow unprotected. But this is not so dangerous as it might at first seem, since it has been found by experiment that a mine is rarely encountered directly on the stem, or, in fact, within several feet of it. The action of the displaced water tends to throw it well to one side or the other, and the towing rope picks it up before it has a chance to strike the ship.

But let us assume that the ship did pick up a mine dead on the stem. The chances are that even in such a case it would not be greatly damaged if equipped with this gear. This is the reason: The German mine, the one with the horns, is so designed that it does not explode at the instant of contact. When a horn is bent or broken, in turn breaking the glass vial of acid which it contains, the action of the latter is not instantaneous. There is a delay of several seconds, the purpose of which is to cause the mine to explode well along the side of the vessel abreast the engine room or at some spot more vital than forward of the collision bulkhead. In such a case the towing wire would pick it up and deflect it well clear of the ship before it exploded, and the chances of serious damage would be slight.

But we need not depend entirely on theory to back us up in this statement. Over four thousand vessels have been equipped with the otter gear, and of that great number there is no record of the destruction of a single ship by a mine although it is definitely established that many a vessel has been saved by the gear.

Launching the Otters

The otters were used—and, in fact, are still used—in all waters less than a hundred fathoms deep where mines are likely to be moored. When the hundred fathom curve is reached the towing wires are bent onto whatever towing device is used and the latter is lowered away. The towing wire is draped over a hook at the rail, called the "easing-out hook," and is held by some sort of a "stopper" to prevent the bight of wire, which is dragging in the water, from pulling the rest of the wire taut and interfering with the launching of the paravane.

When this is done the paravane is swung out on a specially provided crane by means of a second wire called the inhaul wire, which is permanently attached to the otter and drags through the water. This wire is led through a hook, as shown, in order that the otter may strike the water more nearly in its normal running position, allowing it to be launched at much greater speed. When the paravane is out over the water, the stopper, mentioned above,

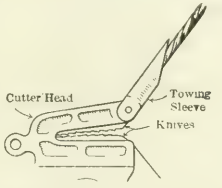


FIG. 7 DETAIL OF CUTTING DEVICE

is cast off and the paravane is dropped. There is a tendency for the otter to dive when it is first launched, and for this reason it is allowed to tow from the easing-out hook at the rail until it has found its depth and is running steadily. Then the hook is paid out and tripped, releasing the towing wire and allowing the otter to find its position a hundred feet or more from the side of the ship.

Many ludicrous statements about the paravane have appeared recently, which only go to prove how remarkable was the secrecy with which the device was guarded throughout the war. A popular misconception is that the otter is self-propelled, the current being conveyed through a wire. Another is that the mine wire is sheared off by means of some mechanical device. The jaws in general use are stationary and contain a pair of tool steel knives with saw teeth, set at a very small angle, so that a comparatively slight pull will sever the wire cable. Any rope that will enter the jaws is cut instantly. Even ⅝-inch wire, which is much heavier than could be used on any existing type of mine, has been cut with no apparent difficulty.

CANADIAN MACHINERY DRAFTING COURSE—PART II

Continued from page 378

the pen, and students cannot do better than to study carefully these two views, and practise inking until a good, straight, clear line can always be obtained. Don't be hasty to blame the pen, ink or paper; be sure it's not the operator. A little time spent in this practice work will be time well spent. The other remaining instruments are the bow pencil, dividers, and pen, so called because of their bow construction. These tools are used for smaller and finer work, and are especially adapted for circles having a radius of less than 3-4 inch, but their use and manner of using are practically the same. Fig. 8 illustrates a typical set of good quality instruments, together with case. Students need not purchase such an elaborate set as shown unless they so desire. For general work in this course a cheaper set will do equally as well. The only reason for showing such a set is to illustrate the class of tools used in the regular drafting business.

Some Triangle Problems

Now that we have gone into the various instruments as used, let us go a little further into the use of the triangles, as started in Part 1. We have so far made 45, 60 and 30 degree lines with these tools, but they have a much wider use, as illustrated in Figs. 9 to 14. Let us consider them in sequence.

Fig. 9 illustrates a very common use, namely, drawing parallel lines at an angle to the horizontal, by means of the T-square and triangle. Fig. 10 illustrates the use of triangles only, and shows the method of drawing a line parallel to a given line. First place triangle A with one edge coinciding with the given line B.C. Now take triangle D and place one of its edges in contact with the bottom edge of triangle A as shown. Hold triangle D firmly with the left hand and slide triangle A to the right or left as desired, until you reach the point through which you wish to draw the line E F.

Fig. 11 shows clearly that by combining the 45 and 60-30 triangles with T-square, you can procure angles of 15 or 75 degrees.

Fig. 12 illustrates the drawing of a rectangle by means of triangle and T-square. First draw, by means of T-square, lines A, B, C and D. Now use your triangle and draw vertical lines CA, and DB, when rectangle will be complete.

Fig. 13 illustrates another method of drawing a rectangle by means of triangles only. Place your 60-30 degree triangle A as shown at whatever angle you desire, then place your 45 degree triangle B on top of same in manner shown. In the dotted position you can draw in the short sides, while in the heavy position you can finish up the longer sides.

Fig. 14 illustrates the method of drawing perpendicular lines on given lines, by means of T-square and triangles. Either combination can be used and both are used for illustrative purposes. From these six illustrations students can get some idea of the T-square and triangle possibilities. By constant practice they will find that these tools become more and more useful as time goes on.

Lines

So far we have only discussed full lines, but now let us go into the matter deeper and find out just what type of lines are commonly used in drawing practice. Refer to Fig. 15 and follow the lines as they are marked, A, B, etc. A represents what is known as the full line, and is the most common of all. B illustrates two different types of dimension lines, each of which is permissible. C shows the dotted or hidden line, which is used to designate a line hidden from view. D is known as a construction line, and is used in various places, such as joining together two views, or projecting across from one view to another, which gives them their name, construction lines, but the name is all we wish you to get at present, for its application will be fully explained later in the series. E illustrates the centre line, which resembles the construction line, but it will be noticed that two dots in place of one go between each long dash. This line and its uses will be discussed fully later. F shows what is known as a border line. This line is similar to the full line, but twice its thickness. We only touch on this line subject in order to give students practice in the following plate, on the various lines. We wish you to memorize the names, so that when the discussion on their uses comes later, it will be that much easier for students to follow.

Now since we have covered so much ground in this second part let us close it by instructions for plate No. 2.

Draw border lines as before, 9x13, and trimming lines, 9½ x 13½, and divide sheet into four sections. Note dimensions and work to these. Study the plate carefully, for all the various lines spoken of in this article are worked in on the practice plate. Draw everything full size. In drawing the dotted lines, make each dot about 1-16 long, and allow 1-16 space between each dot. For the other type of lines study the plate. First draw the lines lightly in pencil, the ink in afterwards. Higgins' black water proof India ink is as good as any. B careful not to make your pencil lines to heavy, otherwise your inked lines wi not be as clear. After completing th plate, write on a separate sheet th style of lines marked A, B, C, D, E, F at Fig. 1 on plate, also lines G, H, I, J K, on Fig. 2, also on plate. The little on Fig. 3 denotes that surfaces are fin ished but the only reason we placed ther on drawing is to familiarize student with their use, for later this point wi be fully gone into.

Above all take care to make your plat as neat as possible. You have tw weeks to complete it and send it in, s you have lots of time to study it u Remember we have three scales for th three best plates received. These scale retail at $1.25, so stick to it and sen your work along, so that you are in shap to tackle the next section and plate No. in the next issue, two weeks from th date.

New Working Hours.—A change working conditions and wages in furn ture factories throughout Canada is for casted by the report of the conciliatio board which held sittings at Toront Stratford, Kitchener, Hanover and Mon real, in an effort to get such informatio about the furniture trade as would e able it to settle a dispute which aro between furniture manufacturers Stratford and their employees. Th board, which reported to the Minister Labor, consisted of Judge D. McGibbo chairman; J. F. Marsh, representing th employees, and Joseph Orr, representin the employers. The board states that "is able to report the successful issue the negotiations, in so far as one man facturer and the employees are concer ed." This manufacturer (The Glob Wernicke Co.) signed an agreeme which is retroactive to February 1, a which might be summarized as follow "Day's work Nine hours from 7 a.m. 5 p.m., except on Saturdays during Jun July and August, when the hours sha be from 7 a.m. to 12 (noon). Overtime Time and one-half, but it shall not considered overtime unless one or all d partments are asked to work extra hou Wages The same for 54 hours' work was being paid for 59."

Tear off and send with drawing

Name .....

Address .....

Position .....

Firm's name.....

WHAT OUR READERS THINK AND DO

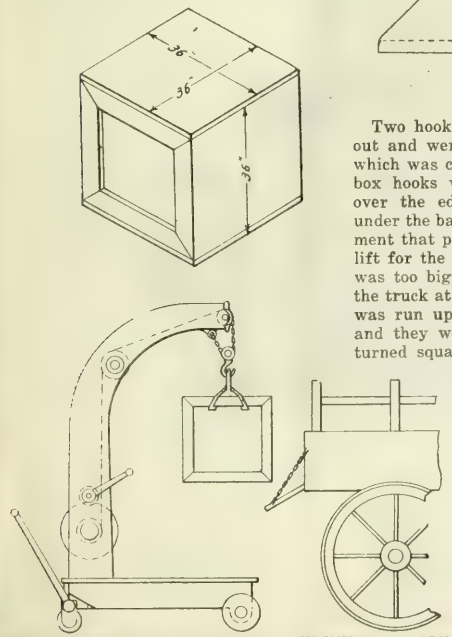
A BOX-HANDLING DEVICE

By Donald A. Hampson

Tight boxes are exceedingly unhandy to load or unload if they contain over two hundred pounds and are of goodly size. Lifting cleats are dear to the heart of the truckman but they are rarely used and are sometimes prohibited.

One plant was required to pack its product in tight wooden cases measuring 36 inches each way. These cases weighed 600 pounds when full and, during the recent war, the output went to the Government on a schedule that called for twenty-five such cases a week. The plant was entirely on one floor, which was practically on ground level, and the work of packing was facilitated by keeping the cases on the floor. The transportation system of the plant was the same as all small machine shops—portable crane, two and four wheeled shop trucks, and lift trucks; these were quite satisfactory except for loading into wagons.

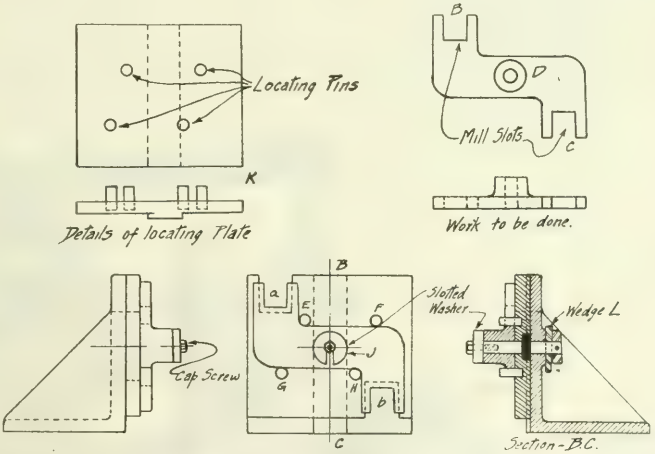
To get the cases in wagons without needing half a dozen men and to do the work in a reasonably short time, the rig shown was made and used in connection with the portable crane. This arrangement saved its cost on the first two loads and thereafter was a constant source of satisfaction as well as a back and money saver.



METHOD HANDLING BOXES WITH A MINIMUM OF WORK

Two hooks of ¾-in. steel were forged out and were connected by a 6-in. ring, which was caught in the crane hook. The box hooks were large enough to reach over the edge of the cases and catch under the battens of the ends, an arrangement that provided a well balanced, safe lift for the cases. The size of the cases was too big to go between the frame of the truck at its forward end, so the truck was run up to the cases set diagonally and they were picked up that way and turned square as lifted above the rails: (the portable crane must always be manipulated so that the weight is very little ahead of the point of suspension on the boom or the crane will overturn with possible disastrous results).

After the cases were raised high enough the crane was pushed up to the wagon, which was backed in on the floor, and the cases deposited in the body. So well did the scheme work out that two men, one in the wagon and one on the floor with the crane, would load five of the cases in as many minutes. More than this could hardly be asked of an expensive and extensive hoist system.



TURNOVER MILL JIG

TURNOVER MILL JIG

By A. E. KIPPS

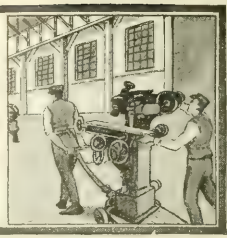
Shown on the accompanying sketch is a turnover milling jig which has proved well worth while, not only from a production standpoint, but also from a point of interchangeability. The work itself is shown at A. The operation consists of milling the two slots B and C.

Referring to the assembled view, the work is centered by a pin, which goes through the hole D, while four stop pins E, F, G and H hold work securely from rocking. A slotted washer, together with a cap screw, which goes into the centre pin as shown, complete the fastening part of the jig. A detail view of the locating plate itself is shown at K.

Briefly the action of jig is as follows. First the slot A is milled, after which the wedge L is withdrawn, and the locating plate tongue drawn out of slot in main body of pig. Work is now revolved 180 degrees, and the other slot B milled likewise.

While jig is shown on this particular piece, such an idea is easily adaptable to many other classes of work.

DEVELOPMENTS IN SHOP EQUIPMENT



AUTOMATIC MILLING MACHINES

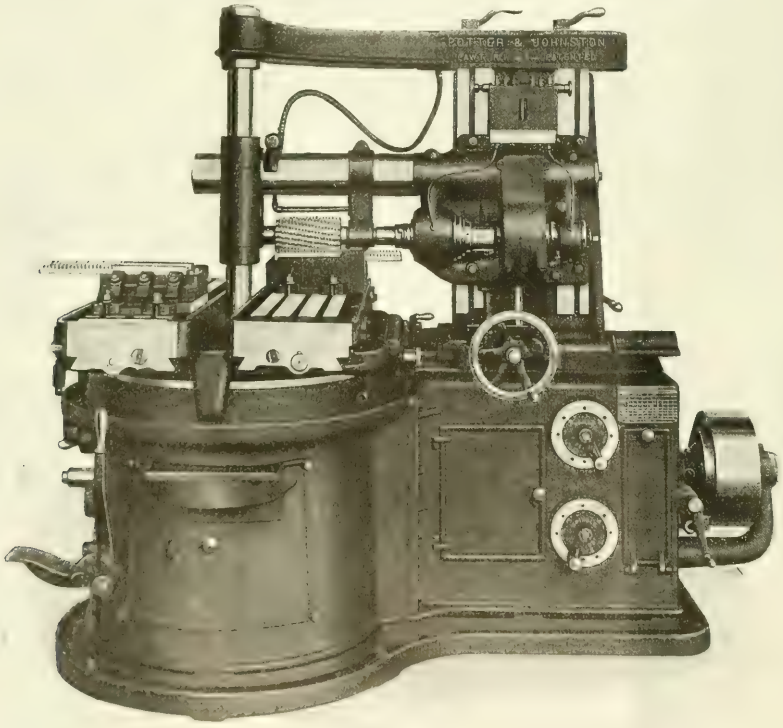
THE announcement has been made to CANADIAN MACHINERY that from now on, until further notice, E. C. Roelofson, of the Roelofson Machine Co. of Galt, will be sole representative for Potter and Johnston's Automatic Milling Machines, with headquarters at 1501 Royal Bank Bldg., Toronto, Canada. All Canadian orders will receive his personal attention, and any literature on the subject will be gladly forwarded to those interested.

This new departure is one which will no doubt please the Canadian trade in general, as the merit of these machines is already well known. A general description supplied to CANADIAN MACHINERY will follow, together with specifications on both the horizontal and vertical types.

The machines, of which the horizontal type is illustrated, have been designed for the purpose of increasing production by the elimination of machine idleness between cuts, which occurs through the use of the ordinary type of milling machine, necessitating as it does much lost time in returning the table by hand, removing the finished work, etc., etc. With the use of the automatic miller all this is avoided, for while the cutter is milling work on the table, the operator is loading up the other. The action is continuous with the exception of 10 seconds required to index the table turret and bring the work in alignment with the cutter, and advancing the table automatically to the cutting point, so that it can be clearly noted that there is absolutely no lost time, thereby insuring a greatly increased output. There are no overhanging arms or projections to interfere with the operator while placing the work in the vise or fixture, and all controlling levers are convenient to the operator. There is no waste of power, as the machine is practically continuously milling.

The table base carrying the work tables is at a fixed height, and of good rigid construction. It is in this base that the mechanism for revolving the table, turret, and feeding is contained. On top of base is a circular rib which forms a channel for the cutting lubricant.

The tables are mounted upon a circula



AUTOMATIC MILLING MACHINE

turntable, the rotation, or indexing of same being on the turret principle. Each table has three T slots, also provision for supporting any fixtures, at the same time so designed to accommodate a splendid lubricant system.

One big feature about the table feed is that the screw, which is carried underneath the table, does not revolve, nor is it splined, thereby adding to its life and accuracy. Provision is made to operate the tables by hand; also to revolve the turret table when setting up. Automatic stops are provided which are adjustable to suit the different working positions. A graduated dial is furnished for the table feed screw. The tables come to their positions automatically and rapidly. As soon as the indexing is completed, the table feed is automatically thrown in. An independent fast table feed is provided, which is a big time saver for such work as straddle, groove, or space milling.

Revolving and indexing is controlled by foot pressure on one lever. Ten seconds only are required to revolve and index the table turret. At the same time the design permits all automatic mechanisms being operated by hand if desired. The spindle is a crucible steel forging, with all provision in the shape of phosphor bronze bearings to take up wear.

The overhanging arm, cutter, arbor, and oiling system, etc., are fully explained in their literature, and is well worth reading, as they state themselves. The automatic milling machine is a strictly manufacturing milling machine for the manufacturer who is manufacturing duplicate parts on a strictly manufacturing basis. Following are the main specifications on their 2M horizontal type:

Spindle:—Crucible steel forging, nose 3¼ in. diam., 3½ thds. R H. 11 B. & S. taper; vertical adjustment of spindle 14 in.

Spindle speeds:—12 changes in geometrical progression from 20 to 180 r.p.m. Three sets of hand-change gears, and four changes to each set of hand-change gears, operated by a lever on side of machine.

Table:—Working surface 37 in. x 12½ in. Oil pan 43 x 12½ in. Three T slots ⅝ in. wide. Distance from top of table to floor, 39 in.

Spindle elevating and traverse screws are equipped with dials graduated to thousandths of an inch.

Table feeds. 16 inches in geometrical progression from ⅞ in. to 12 5-16 in. per minute, giving a range from .005 in. to .068 in. per rev. of spindle for small mills, and from .043 to .615 for large mills. Length of table feed — 28 in.

Overhanging Arm:—Made of solid steel. Distance from centre of spindle to under side of arm, 4¾ in.

Arbor Support: — Greatest distance from arbor bushing to nose of spindle, 21 in. Least, 12 in.

Vise:—Capacity, 6 in. wide; 1⅝ in. deep; open, 3½ in.

Floor Space:—At right angles to spindle, 81 in. Parallel to spindle, 103 in.

Weights:—Net, 7,800 lbs.; dimension of case, 8 ft. 0 in. x 6 ft. 8½ in. x 4 ft. 2 in. Gross, 9,070 lbs.; cubic contents, 223½ cu. ft.

Driving Pulley:—14 in. friction pulley, 5 in. belt, 400 r.p.m. Machine is designed to drive direct from main line, but countershaft can be furnished at additional cost.

Motor Drive:—A bracket is bolted to base of machine; pulley is substituted by a clutch gear, which meshes with pinion on motor shaft. Motor reg'd., 7½ H.P.

2V-Vertical Specifications

Spindle:—As before. Spindle speeds as before. Table as before. Dials on screws as before. Table feeds as before.

Spindle slide support made of solid steel. Traverse moment of spindle slide upright, 9 in. Greatest distance from top of table to spindle nose is 11½ in.; least, 1⅝ in.

Vise:—As before.

Floor Space:—At right angles to tables, 103 in. Parallel to tables, 81 in.

Weights as before. Driving pulley as before.

Motor drive as before.

NEW TYPE ELEVATING TRUCK

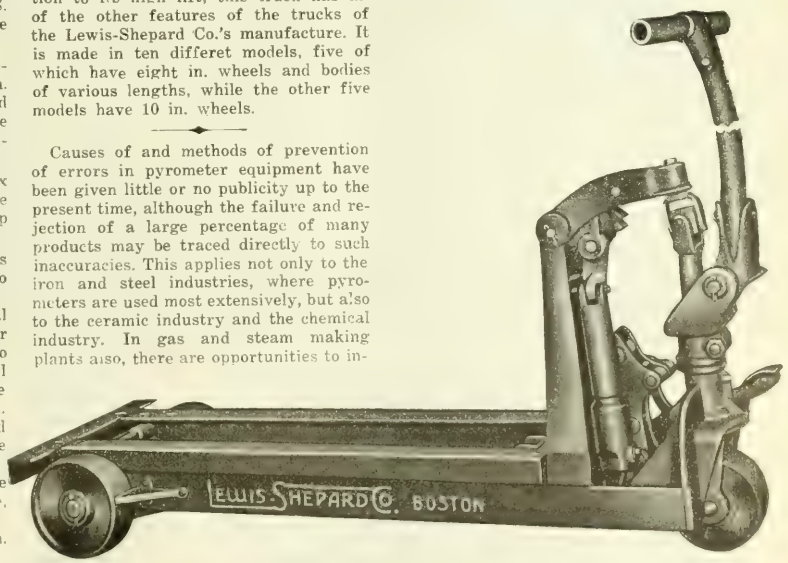
The Lewis Shepard Co., Boston, Mass., have brought out the type G "Jacklift" elevating truck. This truck differs from the type K truck, in that a greater lift of 6 in. is provided. This important feature is of great advantage when it is necessary to convey loaded platforms over steep inclines of the general nature frequently encountered in trucking work, to and from freight cars, etc. In addition to its high lift, this truck has all of the other features of the trucks of the Lewis-Shepard Co.'s manufacture. It is made in ten differet models, five of which have eight in. wheels and bodies of various lengths, while the other five models have 10 in. wheels.

Causes of and methods of prevention of errors in pyrometer equipment have been given little or no publicity up to the present time, although the failure and rejection of a large percentage of many products may be traced directly to such inaccuracies. This applies not only to the iron and steel industries, where pyrometers are used most extensively, but also to the ceramic industry and the chemical industry. In gas and steam making plants also, there are opportunities to increase efficiencies greatly by the use of pyrometers. Many of the most common errors found in pyrometer installations are due to simple causes which could be easily remedied if the user were acquainted with the necesary precautions to be observed in the installation and care of his instruments.

In a large number of plants the pyrometers are seldom or never checked. In many cases this lack of checking is because the user is not familiar with commercial checking methods and the necessity for using such methods.

These facts are brought out and thoroughly discussed in a new bulletin just issued by Leeds & Northrup Company of Philadelphia, entitled "Checking Thermocouple Pyrometers." It discusses the importance of maintaining standards and of checking in pyrometry. It points out sources of error and the remedies for troubles in thermocouples, millivoltmeters, cold junctions, and potentiometers. It outlines a commercial checking laboratory, including a special checking furnace, precision potentiometers and standardized thermocouples. This bulletin is distributed free and should certainly be in the hands of every manufacturer, the quality of whose product depends upon temperature control by pyrometric means.

SAULT STE. MARIE.—Opening navigation to the Soo last week, the earliest in 41 years, the steamer Pargny docked at Kemp's fuel dock. The steamer is the first of the fleet of winter storage wheat vessels from Georgian Bay ports scheduled to break through the ice in Hay and Mud Lakes. A great deal of ice-breaking was required.



ELEVATING TRUCK.

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An Estate That Shrunk

WHEN the Lusitania went down in May of 1915 one of the victims was Charles Frohman, reputed to be one of the wealthiest and most successful theatrical managers in the business. He was associated with enterprises, gigantic and spectacular, where millions were at stake.

At the time of his death he was spoken of as a millionaire, and his listed assets were put down as $919,383.

Almost four years later, when the appraisal was filed in the surrogate office, his actual net estate was put in as $452. In other words, his real financial wealth —or supposed wealth—had shrunk 99 per cent. Two brothers and four sisters will each receive $74 from the estate.

Frohman's presence was necessary to the well-being of the schemes he had under way. He had, apparently, no stocks or bonds, no life insurance or mortgages—none of the sure and safe forms of investment that work just as well after the investor has departed.

Men with dependents should always keep that before them in making investments that they count upon to yield earnings after they have gone. Get something that is just as valuable the day after your funeral as it is to-day.

What the Paravane Did

NOW that the British navy has completed the task that was set before it during the war, some of the "secrets" are beginning to come to the surface. Considering the efficiency of the German spy system the remarkable thing is that such remarkable appliances could have been applied to naval vessels without the secret going to the Germans.

There have been numerous stories—some of them very good ones, too—of how the British fleet was dealing with the sunken-mine menace. We have been told of mysterious grappling chains, of nets and of mysterious contrivances that gathered up the submarines and stacked them on the shore.

But the story is now out, and there is nothing mysterious or unreal about it. It was simply a case of pitting British brains against German deviltry, and in the contest British brains won. In fact, it looks as though the efficiency of the moored mine as a means of destruction had been largely discounted.

As we have said, the Admiralty equipped in the neighborhood of four thousand vessels of all types with the otter gear, and there is no question but that this vast programme paid for itself over and over again in the vessels which were saved from damage or destruction. Soon after the United States joined forces with the Allies, an arrangement was made with the Admiralty to permit the building of the gear in this country, and up to the time of the armistice several hundred vessels of the Navy and Emergency Fleet Corporation had been equipped.

A vessel was, or rather still is, engaged in the testing of paravanes after they come from the factory, for those vessels already fitted are still using their paravanes, and in all probability will continue to do so until all danger of mines has been removed.

The name of the contrivance probably gathers its first syllable from the Greek prefix "para," meaning "along side of," for that is just where the Burney gear was towed. Commander Burney was the inventor of the Paravane, and in some cases it is still referred to as the "Burney gear." The contrivance was first perfected in the naval yards at Portsmouth, England, in the dark days of the war when the mine and submarine were making it hard work for the Allies to keep their tonnage totals from going back rapidly.

The Paravane, described elsewhere in this issue, has won its place in the sphere of truly great things.

Staggering Totals

FIGURES that are being computed now in regard to the casualties of the war are so colossal in their aggregates as to baffle intelligent comprehension.

It may seem strange to make the statement, but it is a fact that the human mind gathers very little detail from the bare statement that over 7,000,000 men were killed in the war.

The figure is too big. It may be reduced by one who has a love for mathematical detail to the point where it might be a two-abreast endless procession.

There were mobilized by all the nations 59,176,864 men. Killed, 7,781,866; wounded, 18,681,257, and prisoners or missing, 7,080,580.

Civilian deaths were also large, especially in countries where whole territories were forced to flee before invaders, and where hunger and disease played havoc. In fact, figures used by the *Current History Magazine* give it that 9,185,329 deaths in civilian life were due either directly or indirectly to the war, making a total death list of nearly 17,000,000 people.

Mobilization is computed as follows:—

	Total	Killed	Wounded
Russia	12,000,000	1,700,000	4,950,000
France	7,500,000	1,385,300	2,675,000
British Empire	7,500,000	692,000	2,037,325
Italy	5,500,000	460,000	947,000
Serbia	707,343	322,000	28,000
Rumania	750,000	200,000	120,000
United States	4,272,521	67,813	192,483
Belgium	267,000	20,000	60,000
Germany	11,000,000	1,611,104	3,683,143
Austria-Hungary	6,500,000	800,000	3,200,000

In proportion to enlistment, Serbia was the heaviest loser for the Allies, with 45.5 per cent. Others follow in order:—

Serbia	45.5
Rumania	26.7
France	18 5
Russia	14.2
British Empire	9.2
Italy	8.4
Belgium	7.5
United States	1.6
Bulgaria	50.3
Turkey	18.8
Germany	14.6
Austria-Hungary	12.3

Changes Needed In Boiler Inspection Laws

(By T. H. FENNER, Associate Editor, CANADIAN MACHINERY)

TO get a clear conception of the possibilities of the order-in-council affecting the inspection of boilers in the Province of Ontario, it is necessary to look into the manner in which the law is at present administered.

This work comes under the jurisdiction of two different Government departments: one whose chief concern is carrying out the inspection of factories, under the chief factory inspector, the other the inspection of boilers under the chief boiler inspector. The work of each is apportioned as follows:

The boiler inspection department work comprises the supervision of preliminary design, the approval of plans, inspection during construction of all steam boilers of pressure containing vessels built in, or for use in the Province; all second hand boilers offered for sale for use in the Province, and all repairs to boilers that are to be used in the Province after repairs; all steam pipe arrangements in connection with these boilers have to obtain the approval of the chief boiler inspector.

The work starts with the plans of a new boiler. Any person who wishes to build a steam boiler for use in the Province must first submit the design to the inspection department. If the plans are satisfactory the chief inspector stamps them, and a register number is affixed, which is also stamped on the boiler when built. In this way it can be traced at any future date. During the construction the material is inspected, particulars of plate and stay steel submitted to the department, and the construction is followed through every step, until the final hydraulic test is made, and the boiler ready for shipment.

So far so good, but at this stage all control of the boiler passes from the boiler inspection bureau, and comes into the purview of the factory inspector's office.

The factory inspection board have as their duties the enforcing of the Factory Act, pertaining to the conduct of industrial establishments. The provision of adequate guards on gear wheels, belts, shafting, elevator shafts, etc., safety brakes on passenger and freight elevators, and safety gates on elevator shafts are among their duties, as well as seeing that punching presses, circular saws, groovers, planers, and such dangerous machines are properly protected. Sanitary arrangements in the factory and furnishing of adequate means of maintaining personal cleanliness of operators engaged in the dangerous trades, such as white lead manufacturing, are also in their line.

While making the inspection of the factory the inspector is also supposed to see that the certificate of inspection is in its place in the boiler room. He should see that it bears a date not more than one year previous to the date of his present visit. So long as this condition is fulfilled, the factory inspector is satisfied. Whether the inspection made was of any practical use or not does not worry him. Not being very familiar with boilers, he is in no position to judge on this point. The inspection may have been worthless, which is very often the case, and the boiler actually in a dangerous condition. This does not enter into the factory inspector's calculations. He is merely concerned in seeing that a certificate is in place. Very often it appears that he does not even satisfy himself on this point, as there are many cases where boilers have not received any inspection at all for many years.

The factory inspection branch sends out a form letter to manufacturers, containing a copy of the revised laws relating to boiler inspection. On the bottom of this is a polite sentence in black type. "Hoping to receive your Boiler Inspection Report." On the back of this letter, there is a form which is designated as an "unofficial form, which may be used as a guide for making out boiler inspection certificates," This form contains a number of statements covering a general description of the boiler and fittings. No mention is made on this form as to the percentage of strength of longitudinal seam, thickness of metal, or of any factor governing the safe working pressure. There is a line with the direction "Record safety steam pressure." The safe pressure is, evidently, what the engineer likes to make it. On the bottom of the form are these words: "I hereby certify that I have had charge of a boiler and engine for a period of over ..... Years, or hold a Stationary Engineer's certificate for the Province of Ontario, and that I have examined and tested by hydrostatic pressure and other tests the above boiler," and a line for the engineer's signature.

A Dangerous Practice

This is what the factory inspector, a person usually himself (or herself) ignorant of boilers, has to guide him in his opinion of the safety of the boiler. Not only this, but the form of the certificate encourages what is in fact a dangerous practice, that is the hydrostatic testing of a boiler by a person totally unfit to carry out such a test. If we accept the fact that very few engineers in the Province are competent to carry out an internal inspection of a boiler, it is a fact that still fewer of them are fit to carry out a hydrostatic test. A hydrostatic test carried out by a person not fully conversant with the principles of governing boiler construction, is very liable to hopelessly damage the boiler, and leave it in a dangerous condition, after which the tester cheerfully signs his name to a certificate recording the safe working pressure, which the factory inspection department accepts as perfectly adequate.

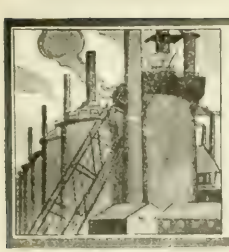
So we see that a boiler may be working under absolutely unsafe conditions, and the man firing it, the owner sitting in his office above it, the employees in the factory above him, and the Government department which should be looking after all their safety, all in blissful ignorance of the potential volcano in the basement. The department that is competent to regulate this matter, has had nothing to say about it since the boiler left the shop, or if it is an old boiler, never. If their attention is called to a boiler by some outside agency, and they find it unfit to work, they have no power to shut it down, except through the factory inspection department. The boiler inspection department notifies the factory inspection department, which thereupon takes steps to have the boiler closed down. These steps may take several days or perhaps weeks. If in the meantime there is a fatal accident, who is to blame?

No Exaggeration at All

The reader may be inclined to say that this is an exaggerated and alarmist view of the conditions. Let us see if that is the case. Two very recent cases will go to show that there is no exaggeration or striving for effect.

The first is that of a boiler working at 90 lbs. per square inch steam pressure. Inspection had been made at irregular intervals by the engineer operating the boiler. No insurance was carried. By some means an inspector of the boiler inspecting department was asked to make an inspection. He was amazed to find that the boiler was working at about double the safe working pressure. The boiler was about forty years of age, and made of iron with the double riveted lap joint in general use in those days. According to the department rules, which by the way are based on the rules of the British Board of Trade, the boiler had never been fit for a higher pressure than 60 lbs. per square inch even when new. Taking the facts into consideration, the inspector ordered the boiler to be put out of commission, or to be precise, recommended the factory inspection department to order it to be closed down.

Continued on page 390



MARKET DEVELOPMENTS

Firms Are Buying for Stock at New Prices

Canadian Firms Coming Into the Market More Readily Than For Some Time Past—British-Made Iron Finding It Hard to Compete With New U.S. Prices

ALTHOUGH the American market seems to be considerably disturbed by the attitude of the director-general of the railroads in refusing to acknowledge the new steel schedule and make purchases accordingly, this feeling is not reflected in the Canadian market. Buying of stock supplies is being undertaken on a larger scale here than for three years past. As a matter of fact, it has been impossible to buy for stock for a long time, but even since the signing of the armistice none has been done. The trade here apparently thinks the last announced prices will stand for some time. Warehouses are placing good sized tonnages of plates, etc. Manufacturing concerns are in the market for car lots of tubes, a thing that has not happened here for some time.

Some slight price concessions are also noted in the matter of chain. There are several similar lines that refused to make any announcement on the 21st of March as to price reductions, but most of them are gradually falling in line, and new lists reflect the drop in steel and iron.

There are no reductions in sight for small tools such as reamers, etc. In fact there are indications that in some cases increases may come before decreases. All these lines are still away above the prices of pre-war days, in some cases as much as two and three times the former price.

Pittsburgh advices tend to the belief that buying is not brisk in the steel trade; in fact, it is far from that, and one of the chief pastimes is casting about for a satisfactory explanation. It is stated in many circles that the attitude of hostility displayed by Director-General Hines toward the new prices is the cause of the trouble. This line of argument does not hold all the way through, because there was plenty of time for the general public to come in and buy all the steel it wanted long before Hines made his stand known, for it was days after March 21 that he announced his hostility to the new schedule.

English made lines of iron and steel are having a hard time trying to get established once more in the Canadian market, owing to the difference in price of competing American lines. The Old Country prices seem to have a tendency to move upward, while there have been all-round reductions in the selling figures of American products.

MONTREAL BUSINESS IS DUE TO IMPROVE AS NAVIGATION OPENS

Special to CANADIAN MACHINERY

MONTREAL, April 17.—Renewal of industrial operations on a pre-war basis is still more or less hindered by the delayed progress in the price adjustments from a war to a peace level. Many factors combine to make the problem a complex one, but little prospect of business revival can be expected until present controversy culminates in a satisfactory solution, so as to permit of reliable action being taken by those who are awaiting a definite announcement regarding a price that will be acceptable to all concerned, and on which they can base their future operations.

In general, business in this district is of fair volume and the character is apparently satisfying to manufacturers and dealers. The passing of the winter and the opening of the lakes and rivers has invariably been a signal of better times, and this year is no exception. Machine trade is not brisk, but continues steady. Old materials are again quiet after a brief period of prospective activity. Little can be said of metals, other than that the situation has developed few changes and the general demand is quiet. Speculation is shown as to the possible effect of May Day on the labor situation. Some uneasiness is felt, but hope is expressed that the amount of labor available will act as a check on strikes generally.

Business Still Deferred

Despite the fact that steel prices are gradually resuming a position more in keeping with present conditions and demands, business activity has not shown any marked tendency to increase in volume. The controversy that is still going on in the States regarding the fixing of prices, has naturally had its effect on the Canadian situation, the consequence being that the trade are in a retrenching mood regarding the buying of material for contemplated expansion or development.

Dealers here are patiently awaiting decisive action, and are uncertain as to the attitude that will be taken by the American authorities on this matter. It is not altogether improbable that restrictions will be removed, thus leaving the situation open for general trading on a basis where competitive prices will pave the way for a steady return to normal domestic business. A factor that will have to be taken into consideration with an open market, is the labor situation, as keen trade competition would eventually result in a lower wage scale than that prevailing at the present time. This is a phase of the industrial situation that will require careful handling to minimize dissension in the ranks of labor. Local trading is taking on a more encouraging aspect, due largely to the early opening of navigation, which is expected within the week. This is a period of the year when added activity is a feature, and dealers are looking forward to considerable increased business.

Few Sales But Good Inquiry

Business in new tools is still of a quiet

character, although good inquiry is reported. Efforts have been made recently to increase the interest of buyers in new machinery, but as yet this has not developed into any heavy sales. General activity, however, is quite satisfactory, as a fair volume of used equipment is still moving, with supply requirements about normal. It is again rumored that a large munitions plant here may be utilized for the manufacture of motors and tractors, but nothing definite will be announced until final settlement has been made with the American Government regarding recent shell contracts.

Old Material Quiet Again

The slight revival that was apparently anticipated from the better tone of last week's market, has again subsided and the situation has taken on its previous dullness, with dealers here awaiting further developments. Some increased buying on the part of dealers has been noted, but this was discontinued when the demand again fell off. The present situation is one where uncertainty prevents any heavy buying, and local activity is confined to immediate requirements. Conditions in the States are still unsatisfactory, and steel interests are still negotiating with the Government for a mutual understanding between the producers and the trade. Until a better working basis is established the scrap market, like that of steel, will feel the effects of pending adjustments, with little trading in the meantime. Dealers here report a quiet week, but are holding firm to quoted prices. No changes are effective this week.

BUYING NOW FOR PUTTING IN STOCK

Bigger Volume of Business Moving—No Lower Prices for the Supplies

TORONTO. — Warehouse interests claim that they are doing as much business now as they were a year ago, and it must be remembered that a year ago those engaged in the steel business had so much on their books that they were not able to get out and chase any new credits. It is a fact that warehouses are buying for their own wants now for the first time in two and a half years. During the course of the war, at least during the latter part of it, warehouses were not allowed to come into the market for the purpose of buying stock. For some time past they have simply been taking such business as comes and sending it on to the mills. Now they are stocking good sized shipments.

A number of the manufacturing concerns in the Dominion have started to buy. One Canadian dealer gave it as his opinion that the situation at present in the United States was in the hands of the steel concerns, and not of Director-General Hines of the U. S. Railroad Board, who refuses to buy at the present prices. The railroads can no more get along without buying steel than they can operate their dining cars without buying meat and potatoes, and it is only a matter of time until orders will have to come from the roads, either through the director-general or some other source.

The American situation is not being reflected in the Canadian market, as some of the large concerns in this country are out making purchases, apparently satisfied that there will be no lower prices for some months to come. One large shop placed specifications to-day for car lots of boiler tubes.

A slight reduction is noted in the price of electric weld and fireweld chains. It has not been announced yet but will work out at about one cent per pound. Chain is the same as tubes and other articles that stood pat when the new steel prices were given out. They are seeking a lower level. The belief seems general that prices are not going to be lower on a good many of the standard lines for some time to come.

Old Country goods are slow to get back on the Canadian market and it looks as though the price were having a good deal to do with the failure. While prices of American and Canadian steel show a tendency to come down in price, the Old Country material is going the other way. This can be illustrated by taking two standard makes of iron that have been sold in Canada for some time (imported). Lawnoor iron is an old Country product of good quality, and is in demand for boiler stays, chains, hooks, etc. It used to be sold for four to five cents per pound, and now it is holding a warehouse price of 10 cents per pound. After the armistice it receded slightly but has since come back to the ten cent mark. "Rome" iron is a well-known American product which is now selling at 8 cents per pound. Before the war the price was almost identical with "Lawmoor." The U. S. product has come down in price while the English has increased. In fact English prices show no tendency at all to come down to within shooting distance, with the result that little business is going to Old Country concerns from this country.

Supplies are Firm

Dealers in supplies state that they hear of nothing that would indicate any coming down in prices. In fact all the war prices have been maintained in the supply business and there is talk now of using these war levels as a start and building from them. The business of finding the selling price of any article is still quite a mathematical problem. Take, for instance, a side milling cutter that is listed at $15.05. Add to this a fixed "increment" of $8.50. Then add another $8.50, and after that is finished start again and put on another $4.25. This refers to American goods being sold in this country, so there is 40 per cent. added to the price, which makes a grand final total of $50.82. Now just to show that there are plenty of things to keep folks engaged even if the war is over for the present, American makers, on the 25th of March, put drills up ten per cent. Dealers are not talking any lessening of prices in any of the lines of supplies. In fact they seem certain that in some cases there will be increases.

Fair Volume of Business

Machine tool dealers state that they are pleased with the way in which business is coming, and they see in the circumstances indications that buying is getting better, and that orders that have been held back must soon come out into the open, where they will have a chance to convert them into real business. There are sales being made of wood-working equipment. In fact if anything this line just now is better than the metal working end. Firms handling motors are also doing a good business.

POINTS IN WEEK'S MARKETING NOTES

New York reports that the feeling among buyers is that the prices of machine tools are too high, and they are staying out of the market until reductions are made. Reductions since the first of the year have amounted to 5 to 10 per cent. with the exception of shapers and planers, which have gone down about 15 per cent.

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The American machine tool market is anxious to see the war machinery absorbed as quickly as possible, as it is a disturbing feature in the market.

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There is a feeling in Canadian centres that steel prices are reliable for some time to come, and buying is being started on a larger scale, several car lots being on order by firms that have not bought for stock for over three years.

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There is a tendency towards higher levels in the scrap market, although dealers do not feel justified yet in naming higher levels locally.

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English steel and iron are having a hard time getting a place in the Canadian market owing to price difference. British prices are going up, while U. S. prices of competing lines are coming down.

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Drills, taps, reamers, cutters, etc., hold their war-time price, and indications are that lower prices are not going to come for some time.

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Pittsburgh reports that orders received now at the steel mills are very small when compared to the volume that has been placed in recent years.

WAITING FOR PRICES TO LOWER BEFORE MAKING THEIR PURCHASES

Special to CANADIAN MACHINERY

NEW YORK, April 17.—Machine tool builders report that they are doing a fair business in the Chicago and Detroit districts, but comparatively little in the East, especially during the past two weeks, when the controversy in Washington between the Railroad Administration and the Industrial Board of the Department of Commerce has helped to intensify the hesitation among buyers. There is no denying, also, that prospective buyers of machine tools have made up their minds that present prices of tools are too high, and the most persuasive arguments of tool sellers are of little avail in closing business when the buyer is convinced that by waiting a little while he will get a lower price. Reductions since the first of the year have been moderate on most lines, not exceeding 5 or 10 per cent. as a rule, though greater reductions have been made on a few lines, notably planers and shapers, which have been reduced 15 or 20 per cent. In nearly all lines, however, there are machine-tool builders who have ignored reductions by their competitors, and are quoting the same prices that were in effect when the war ended. In defense of present prices these tool builders say that their prices were never raised inordinately, but only enough to cover advancing costs of labor and material, and as labor, constituting about 80 per cent. of the cost of precision tools, has not been materially lowered, these tool builders argue that they cannot, under present conditions, make reductions. Furthermore, many tool builders have been building tools out of material bought before the war ended and consequently they have not yet gotten the benefit of lower pig iron and steel prices.

If all of the inquiries now pending were to be immediately transformed into actual orders the machine-tool trade would have little to worry about for some months to come, but buyers are in no haste to act upon their inquiries. Hundreds of tools have been inquired for in the New York market in the past thirty days which have not been bought.

Waiting for the Peace Treaty

Export business shows no greater progress than domestic business, but there are indications that it will open up shortly after the peace treaty is signed. By that time it probably will be possible for foreign Governments to negotiate loans in the United States with which to finance purchases. A representative of a Belgian machinery concern which before the war handled German tools almost exclusively, has been in this country for several weeks and has obtained the agencies for several leading lines of American tools. His statements to machine-tool builders that German tools will not be handled in Belgium for many years to come, if ever, is encouraging. Before the war American tool builders found it difficult to meet the competition of the German machine-tool trade in countries contiguous to Germany because of the lower prices quoted on German tools.

Machinery dealers who are members of the National Machinery and Supply Dealers' Association met in Washington on Friday to discuss with the Director of Sales of the War Department the plans arranged for the disposal of Government-owned machine tools bought for war plants. There are hundreds of new tools, some of which have never been uncrated, which will be turned back to the manufacturers who built them, but in case any manufacturer refuses to take back his own tools they will be placed on the market. All used tools will be sold through dealers. A dealer will be selected in every district as a Government agent, and he will offer the Government tools for sale, receiving as his commission 7½ per cent. of the sale prices. The selling prices are to be fixed by the Government by appraisal. It is understood that there are some machinery dealers who object to the plan because it will not give them as large a profit as they receive on their regular lines of new tools. The Bureau of Aircraft Production, which hasn't as many tools to dispose of, is adopting a different method. It is sending out lists of tools which are for sale, many of these tools still being in use on airplane work. One list just issued covers about 50 or 60 tools at the plant of the Union Switch & Signal Co., Swissvale, Pa. Unquestionably the sale of the Government tools will be a somewhat disturbing market influence, and the trade will welcome action which will dispose of this equipment as quickly as is possible.

Buffalo.—One of the most spectacular launchings ever seen in Buffalo took place yesterday afternoon, when the steamer Lake Fugard was dropped over. The launching was a success in every way.

CHANGES NEEDED IN BOILER INSPECTION LAWS

Continued from page 387

The second case was one in which the conditions were reported to the inspection department by an inspector employed by a private company. A letter was despatched to the boiler owner advising him of the dangerous condition of his boiler. This gentleman replied that everything seemed to be in as good shape as at any time within the last few years, but that in any case some extensive alterations were in contemplation for the near future. He further stated, that a boiler maker had looked the boiler over, and assured him it was all right. The boiler inspection department then took the matter up with the factory inspection branch, with the result that the boiler was shut down after some delay. Every minute this boiler was working there was a risk.

Over and above this, in spite of the law, there are many boilers throughout the Province that have never had any inspection, even an incompetent one. This is a condition that should not be allowed to exist and need not be.

The boiler inspection department should have control of all boilers in the Province, if it is to carry out its work to the best advantage. By this it is not meant that the department should carry out the actual inspection, beyond the inspection during construction. The report of the inspection, if carried out by a competent man, would keep them familiar with the condition of the boiler from year to year, and they could tell at once from the report whether it had been made by a competent man or not. They should have the power to take summary action in any case where in their opinion it was needed, without waiting to refer to any other department, or any red tape of any kind.

The work carried out by the boiler inspection department is, as far as it goes, excellent. It should be carried out to its logical conclusion. They should have a complete record of every boiler in the Province not only up till the time it leaves the builder's hands, but during every year of its life.

The Government and public could then hold the boiler inspection department directly responsible for the safe condition of every boiler in the Province. As things stand now, it is quite possible for a boiler to be working in a dangerous condition, and the boiler inspection department having no means of finding out. Where the boilers are insured, the chief inspector gets a report of their inspection, which is fully detailed, and allows him to form a reasonably close opinion of conditions. Where the engineer carries out the inspection, the report may be valueless. There may be other cases where no report is made, and no inspection carried out. The factory inspectors should see that such cases are promptly reported, and not allowed to go on from year to year, as many have done in the past. We have heard of a factory in a city, not a rural town, that had never seen a factory inspector since they had been in business.

THE WAY OF PRICE REGULATION IS A VERY HARD ONE JUST AT PRESENT

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., April 17.—The finished steel market is absolutely stagnant. The flow of orders after the price reductions that became effective March 21, soon subsided, showing that not a great deal of business had previously been held back in anticipation of the price reductions. The average of buying since March 1 to date has been much less than the average during January and February. Why the market should not become more active instead of less active is very difficult to understand. Of course the matter of price enters, but still there is always a considerable volume of business that is placed, irrespective of price. Equally difficult to understand is the high rate of operation that the mills maintain. In point of percentage of capacity the production may not seem heavy, but the case is different when one reflects that present capacity is 40 per cent. greater than capacity in 1914, being now fully 49,000,000 tons of steel ingots a year, against 35,000,000 tons in 1914. Actual production in the two best years before the war, 1912 and 1913, was only between 30,000,000 and 31,000,000 tons. Yet below are given annual rates of production in the past three months, computed from the monthly reports of the Institute, covering the output of 30 companies reporting monthly, which made 84.03 per cent. of the total steel in 1918 together with the percentage of production to capacity, taking the latter at 49,000,000 tons:

	Tonnage rate	Percentage
January	42,000,000	86.9
February	41,700,000	85.1
March	37,900,000	77.3

The present rate is about 70 per cent., or 34,000,000 tons, but that is a rate 10 per cent. greater than the best output in a year before the war. Practically complete statistics of steel ingot production in 1918 are now available, making the following comparison:

1905	19,463,189
1910	25,154,087
1915	31,284,212
1916	41,401,917
1917	43,619,200
1918	43,027,000

Price Uncertainties

Steel producers naturally take the position that the present abstention of the public from buying is due to the controversy in Washington over prices, between the Industrial Board and the Railroad Administration, but the public had an opportunity to buy at the price reductions of March 21, before it became known that the director-general would not pay them, and the public did not do so to any great extent.

There is no possibility of the director-general "accepting" the new steel prices. He has made it clear that he regards them as altogether too high, and he has also expressed disapproval of the idea that it is for best interest of the country for the public to be encouraged by announcement that prices will not be reduced for the remainder of the year, to buy at these prices if they are too high.

That the prices are very high is obvious. The Government prices were not especially high, in the circumstances of the war, but now conditions are different. There were heavy taxes, and when the war ended large sums had to be written off for various adjustments. By the time the Steel Corporation was through with its adjustments it had only $199,000,000 to report as regular earnings for 1918, this being about one-fourth more than the best showing before the war. The corporation's total profits, however, from which various deductions had to be made by reason of the war, amounted to some $550,000,000, and it may readily be computed that if in 1919 its total profits were one-half as much, or $275,000,000, its taxes would be about $57,000,000, leaving, after paying subsidiary bond interest, about $10,000,000 more than the earnings shown for 1918. As the 1918 profits were made at Government prices, with shipments at 88 per cent. of the present capacity, it can readily be seen that large price reductions can be made and leave very substantial earnings, provided there is anything like full operation.

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STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

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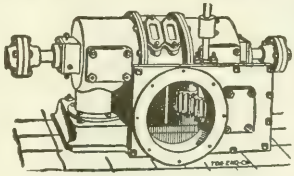
WATER POWER DEVELOPMENT



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Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

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BELLEVILLE, ONTARIO

The difficulty in this whole price controversy is simply this, that relatively light production is expected and large profits per ton are desired in order to pay the overhead. Thus the statement has been made that it cost $46 a ton to make Bessemer rails in January, and no doubt it did, but a very considerable part of the $46 was overhead, for the Bessemer rail production was very light.

The steel producers are now very much divided in attitude as to prices. Some, of course, hold that the director-general is wrong in his contention, and that he has done much harm in refusing to endorse the proposed prices. Others, however, and a rapidly increasing number, rather take sides with the director-general, and as price stability seems now out of the question, favor an open market as the quickest and best way to get business started. Those who want an open market are the optimists, in that they believe it is possible to get business going again. Those who want to maintain prices, however optimistically they may talk, are pessimists, believing that conditions are such that business cannot be stimulated and that it is better to get as large profits per ton out of the business that must be placed from day to day, no matter what the price

Pig Iron

The blast furnace interests were not satisfied with the Industrial Board adjustment of prices, feeling that steel products were not reduced nearly enough in proportion to the pig iron reduction of $4.25, which they computed was 14 per cent. Since then the dissatisfaction of the merchant furnaces with attempts to regulate the market artificially have greatly increased. The merchant furnaces want an open market, as they had practically all the time before war time Government price regulation came. They had their good years and their poor years and they are willing to average up now as they did in the past. Their costs are high and they feel the way to get costs down is to blow out, which the furnaces are doing now in increasing numbers.

It may be asked why there is not an open market in pig iron if the furnaces want one. Possibly there is already. One can only ascertain by inquiring for a reasonable tonnage, and of such inquiry there is none.

The Lake Superior iron ore interests are reported to be dissatisfied with price regulation. Their trouble is that the fancy freight rates on ore from mine to lake dock have not been reduced. They are blamed with asking high prices for ore, at Lake Erie dock, when a large part of the cost is freight, and the ore roads stand to make very large earnings, which will go into the Railroad Administration's revolving fund and help to make good the lighter earnings of other roads, under the Government guarantee as to earnings.

BUYING OF SCRAP CAUSES THE PRICES TO START ON UPGRADE

THE scrap market continues to show strength over most of the country. Some large purchases have been made which have had the effect of boosting prices. Following are the reports from various U.S. centres:

PITTSBURGH.—Heavy buying by the Carnegie Steel Company has had the effect of stiffening prices in many grades, although their purchases were mostly heavy steel. Cast borings have gone from $12 to $14, while heavy breakable cast has risen from $16 to $19. The strength shown in these grades has the effect of stiffening the price in other grades. The Carnegie Company bought about 15,000 tons.

NEW YORK.—The demand for heavy melting steel and wrought material here has resulted in a still further advance in price of about 50 cents. The Government was a purchaser of shell steel to the amount of 15,000 tons, the material being sold as scrap. There has been a slight advance in machine shop turnings. Heavy melting steel is selling at $12.50 to $12.75.

PHILADELPHIA.—The market on the whole is quiet. Wrought material and clean cast borings have undergone a slight advance, wrought pipe selling at $18 to $19, and cast borings at from [illegible] There is very little demand for steel scrap, though during the past three weeks this grade [illegible]

BUFFALO.—While there is a brisk enquiry for all grades on the list, sales have been light. It is believed among dealers that it will be but a short time till the real buying movement starts. Low phosphorus is quoted at $21 and $22, and No. 1 railroad is up to $19 and $19.50. Stove plate grade is quoted at $18 50 to $19.

CLEVELAND.—The decision of Railroad Director-General Hines has resulted in a softening of the market. Offers to sell are coming out in abundance with few looking to buy. Heavy melting steel has gone back to $15.75, while No. 1 bushelling has gone to $15.50. Dealers are of the opinion that it will take three or four weeks to develop a buying market.

CHICAGO.—There has been a good demand for heavy melting steel, one of the large cousumers in this district having offered $16 a ton for a large amount around 2,000 tons being sold at this figure. The list on the whole is higher than last week. The railroads are offering fair amounts, one road offering more than 6,500, including 1,150 tons of No. 1 steel rail.

CINCINNATI.—The market here is laying low, with a marked scarcity of transactions. While it is thought by some dealers that prices will not go any lower, they are not showing the courage of their convictions by laying in stocks. Demand for heavy melting steel slack.

BIRMINGHAM.—With no demand heavy melting steel, and old contr for other scrap being completed, t is almost a complete cessation of b ness.

MR. OSBORNE HAS RETIRED FROM C.P

Has Had a Long and Successful Ca in Mechanical Departments

H. Osborne, after a service of abou years in the employ of the C. P. R., retired from active participation in affairs of the company. Mr. Osb started with the Canadian Pacific 1883 as a charge hand, and after a as foreman, was appointed to the tion of general foreman in 1895. In he was made master mechanic, and years later was appointed superin ent of the Angus locomotive shops 1912 he was promoted to assistant erintendent of motive power. In 19 was again promoted to the positio assistant mechanical superintenden Montreal, and the following year wa pointed works manager of the A shops, a position he held until hi tirement. On this occasion he was sented with an illuminated address a purse of $2,000 in token of the es in which he was held by all his ciates.

SCOTIA WANTS TO GET COAL TRA

MONTREAL.—A report is being culated, and apparently it has orig ed in the United States, that a de tion from the Nova Scotia Feder of Miners will soon confer with Government authorities at Ottawa the feasibility of placing an emb on United States coal.

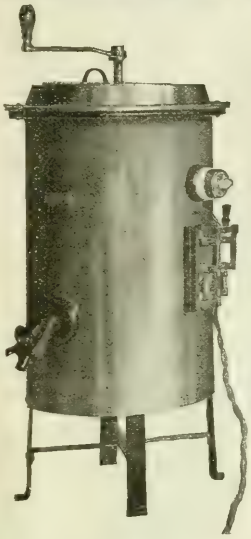
Local people who are interest the present Nova Scotia coal situ state that there is apparently foundation for such a report circulated, as such an embargo not only be impracticable, but un

On the other hand, according to opinion, it might not be impossible a higher preferential tariff be in order that the Nova Scotia would be better enabled to get their business lost during the war ports on the St. Lawrence. This ness since the beginning of the wa gone largely to American operators

The present duty on soft coal c from the United States is some like 53 cents per ton. If this were the situation in Nova Scotia, acc to the belief, would be immeas improved thereby.

It has been estimated that the leum beds in the United States w exhausted in about twenty years and much attention has been paid use of the vast deposits of oil throughout the country.

Aikenhead's Electric Glue Heaters



Steam plants being closed down, quite a number of pattern shops are using Electric Glue Pots.

Glue has the greatest sticking strength when maintained at a temperature of 145 to 150 Degrees Fhr.
It's easy to maintain this heat with "International" Electric Glue Heaters. They operate on dry heat, utilizing every bit of heat generated because conserving it on the fireless cooker principle.
There is no evaporation of water or glue —therefore no waste. There are no burnouts from evaporation of the bath because no water is used in these heaters. More of the glue is wasted because the electric dry heat principle prevents the formation of skin, scum or dirt on the glue.

Cost of operation is bent a trifle.

Less current than an electric flat iron consumes is ample to operate 13 one-quart Electric Glue Heaters.

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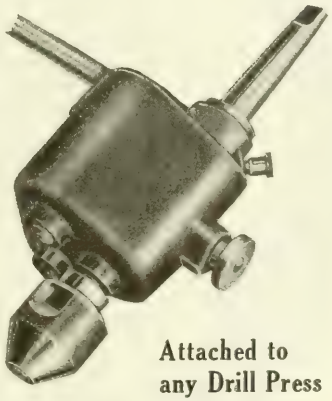
The Advantage of Hand Tapping plus Drill Press Speed

Aikenhead's Wahlstrom Attachment



The oscillating movement mechanically imitates hand-tapping, though 10 times faster, and reduces tap breakage to the very minimum.

And the Wahlstrom attachment is accurate. It taps holes as squarely as they could be drilled.

It is powerful, durable, and trouble proof.

Constructed of hardened and ground steel parts throughout, and has nothing whatever that can get out of order. Takes taps of all sizes up to ½ inch.

Sent on trial. Money refunded if you are not satisfied.

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SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bars, base, Montreal	. 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	. 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

	Per 100 lbs C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$19 00	$20 00
Electro copper	18 50	19 00
Castings, copper	17 25	19 00
Tin	60 00	58 00
Spelter	9 00	8 50
Lead	6 75	7 50
Antimony	8 00	8 50
Aluminum	35 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 5 00	$ 4 50
Plates, 3-16 in.	5 50	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 78
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8I. in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$10 00
Copper, crucible	13 00	12 75
Copper, heavy	13 00	12 75
Copper wire	13 00	12 75
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	8 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	10 00	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	18 00	14 00
Pipe wrought	9 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	5 00	5 00
Stove plate	14 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd brass	net
Nuts, square, blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

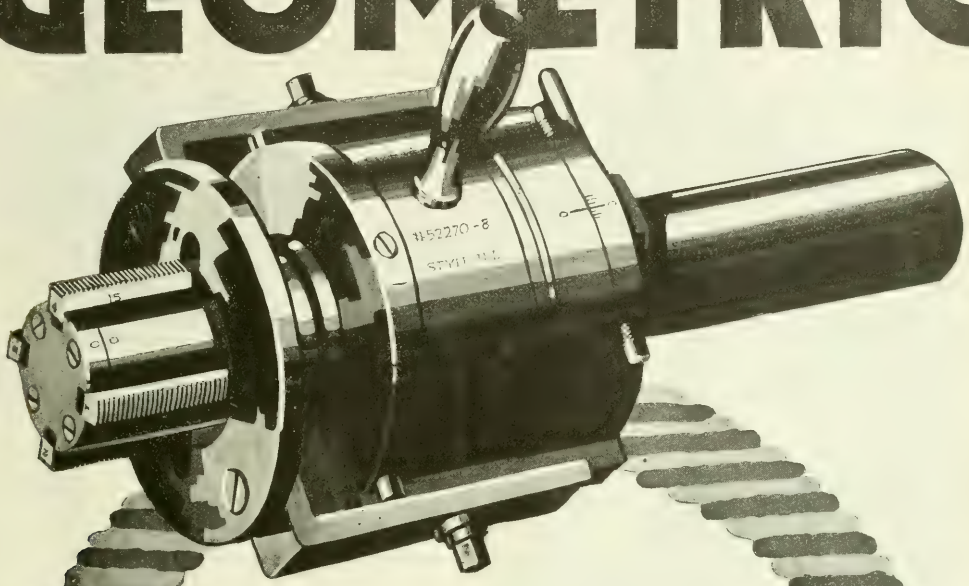
ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto ..... net

GEOMETRIC



The Tap Famous For Good Work

Geometric Collapsing Taps share the popularity of Geometric Die Heads. They have the same good reputation for tapping inside threads that the Die Heads have for cutting outside threads. All objections of a solid tap are overcome in the Geometric Collapsing Tap. They are as rigid as solid taps while cutting, but collapse the chasers automatically when the required depth of thread has been cut. Are adaptable to Screw Machine, Turret Lathe or Live Spindle. Made in sizes suited to any diameter above ¾-inch in straight threads or standard pipe thread sizes.

Write for the Geometric Collapsing Tap Booklet.

The Geometric Tool Company

NEW HAVEN, CONN., U.S.A.

Canadian Agents:

Williams & Wilson, Ltd., Montreal.

The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg and St. John, N.B.

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 25
Sheets, black, No. 10	5 15	5 25
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized		
Queen's Head,28 B.W.G.		
Fleur-de-Lis, 28 B.W.G.		
Gorbal's Best, No. 28		
Colborne Crown, No. 28		
Premier, No. 28 U.S.		7 85
Premier, 10¾ oz.		8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅝ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$25 00	$
1¼ in.	29 99	
1½ in.	32 00	28 00
1¾ in.	32 00	28 00
2 in.	36 00	28 00
2¼ in.	40 00	30 00
2½ in.	41 00	35 00
3 in.	47 00	40 00
3¼ in.		47 00
3½ in.	57 00	48 00
	65 00	60 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	**0 06**
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	**88**
Acme cutting oil, antiseptic	**37½**
Imperial quenching oil	**39½**
Petroleum fuel oil, bbls. net	10¼

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	**1 75**

TAPES.

Chesterman Metallic, 50 ft.	**$2 00**
Lufkin Metallic, 603, 50 ft.	**2 00**
Admiral Steel Tape, 50 ft.	**2 75**
Admiral Steel Tape, 100 ft.	**4 45**
Major Jun. Steel Tape, 50 ft.	**3 50**
Rival Steel Tape, 50 ft.	**2 75**
Rival Steel Tape, 100 ft.	**4 45**
Reliable Jun. Steel Tape, 50 ft.	**3 50**

PLATING SUPPLIES.

Polishing wheels, felt	**3 25**
Polishing wheels, bull-neck	**2 00**
Emery in kegs, American	**07**
Pumice, ground	**3½ to 05**
Emery glue	**28 to 30**
Tripoli composition	**06 to 09**
Crocus composition	**08 to 10**
Emery composition	**08 to 09**
Rouge, silver	**35 to 50**
Rouge, powder	**30 to 45**

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Idea!	16
Superior	18	X press	14
X L C R	17		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	**.14**
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

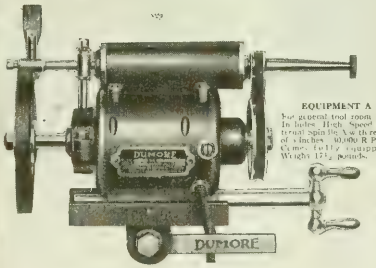
The Specifications Call For .0001±

SUPPOSE you were studying the specifications for a big job—one that called for making new and expensive tools—would your present tool-room equipment let you handle it? There are only two kinds of tools—the good and the poor—there's no half-way mark. And the quality of your output is fixed by the degree of accuracy you can obtain in your tool-room.

Accuracy in grinding depends upon correct cutting speed and perfect running balance. That is why the **DUMORE** grinder has been given speeds ranging from 10,000 to 50,000 R. P. M., along with a dynamically balanced armature. With this tool in your shops you can eliminate chatter, taper or bell-mouthed grinding. Then, too, the **DUMORE** is portable, easily carried to all parts of the shop and quickly set up in any machine ready for use.

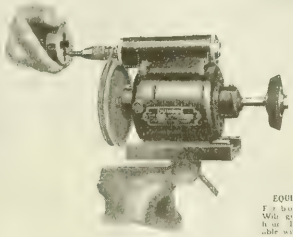
If you are interested in obtaining only the best tools, ask your dealer about the **DUMORE** grinder. If he doesn't carry it, write us for literature and prices.

WISCONSIN ELECTRIC CO.
2910 16th St. **RACINE, WIS.**



EQUIPMENT A

EQUIPMENT B



EQUIPMENT C

DUMORE HIGH SPEED GRINDERS

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

SARNIA.—Preparations are practically complete to begin at once the construction of the Metropolitan Theatre on the east side of Christina Street, just south of Lochiel Street, on the property commonly known as the Bell property, occupied at present by a livery barn. The building is to be erected by the United Theatres, Limited, who have ample capital at their disposal.

TORONTO.—When the votes for peat investigation came up in the local house, Hon. Mr. Ferguson stated that as a result of the co-operation of Dominion and Provincial authorities it was hoped to place about ten thousand tons of peat fuel on the market this year. Little work had been done last year, but he pointed out that one of the new machines was ready to be put to work early this spring.

ST. THOMAS.—The building permit has been issued by the city engineer for the construction of the mausoleum at the St. Thomas Cemetery. The entire cost of construction is estimated at $45,000 by the builders, the D. W. Mitchell Co., of Toronto, and the work will be commenced immediately. The company will use all the local material and labor they possibly can, which in the case of the latter will undoubtedly be quite large.

PERSONAL

William Bischoff is resigning from the position of assistant general superintendent of the Dominion Iron and Steel Co., to accept a similar position with the Lukens Steel Co., of Philadelphia. Before joining the staff of the D. I. and S. Co., Mr. Bischoff was superintendent of furnaces for the Bethlehem Steel Co.

Capt. Samuel Cranged, shipbuilder and master, of Toronto, passed away at his winter home in Los Angeles after a short illness. His wife was with him. Deceased was 80 years of age, and was one of the oldest masters on the Great Lakes. He was superintendent of the St. Lawrence & Chicago Steam Navigation Co., and spent thirty years of his life building steel freighters, comprising among others, the Rosedale, G. R. Crow, W. D. Matthews, James Carruthers, and J. H. C. Hagerty. The body was brought to Toronto for burial.

A very wide circle of friends will learn with sincere regret of the death which took place in Los Angeles of Mr. John H. Hall, head of the John H. Hall & Sons Company, of Brantford. Mr. Hall left with his wife a few weeks ago on an extended trip to the West, and the first intimation of his illness came through on the wire to his sons. Leslie Hall immediately left, catching a train at Waterford, to attend the bedside, and it was the following morning that the sad message telling of death came through. The late Mr. Hall was in his 65th year, and had resided in Brantford for over 40 years. His firm had taken a considerable part in war work and he was off to the West on a vacation, leaving here in the best of health. Death was due to heart trouble. The deceased was a member of Harmony Lodge, I.O.O.F.; Reba Lodge, A.F. & A.M., and the Canadian Order of Foresters. He was a devout attendant at the Park Baptist Church, in which he was a deacon. Besides a widow, four sons are left to survive: Leslie, Reginald, Ernest and Wilton, all resident in this city. The funeral arrangements have not yet been completed.

TRADE GOSSIP

Removal Notice—Ogden R. Adams, Rochester, N.Y., takes pleasure in announcing that he has removed his showroom and office from 159-161 St. Paul St., to 244-246 St. Paul St., Rochester, N.Y. The new location affords very much larger show-room space and more commodious offices, and is located on a prominent corner in the centre of the city, facing the New York Central Railroad, where he will be pleased to receive his friends.

Get After Trade.—There is every possibility that future trade development between Canada and European countries will assume considerable proportions. While there are at present nearly two hundred representatives of Canadian firms in Europe, it is the opinion of Lloyd Harris, chairman of the Overseas Trade Commission, that small manufacturers should organize, with the object of sending agents abroad, for the purpose of obtaining business that would be lost if prices and samples have to be forwarded.

On Adjustment Work.—Lieut.-Col. H. Albee and Major Sidney R. Underwood have been named by Secretary-of-War Baker as the "Canadian contract assessors," provided for by the Canadian Government in the organization of the Imperial Munitions Board. The two officers will act as the representatives of the United States in the settlement of war contracts which were placed in Canada. Lieut.-Col. Albee is well acquainted with the situation in this country, having been in charge of the U.S. Ordnance Department office in this country for some months.

Trade With Poland.—The Polish National Department is urging Canadian interest in the trade of Poland. It believes that the country will shortly be sufficiently settled to afford a good field for foreign enterprise. It confidently expects to get the port of Dantzig, to which it has given again the old name of Odansk. The Commercial and Industrial Bureau of the Polish National Department informs the Canadian Trade Commission that there are large opportunities in the development of the Polish coal mines, water power and sugar beet industries. The coal output of the territories expected to form the new Poland in 1911 equalled one-half of that of Pennsylvania. Bolshevik influence, the bureau asserts, is almost certain to be absent.

A Huge Reservoir.—The Admiralty have recently completed at Rosyth, the Scotch naval base, a large oil reservoir for the storage of oil fuel for the use of war vessels in the Firth of Forth. The reservoir is built of concrete on a rock foundation, the site being the bed of a sandstone quarry, from which stone was quarried for the purpose of building the new dockyard. The use of concrete in this class of work is considered a novelty. The amount of concrete placed in position amounted to 98,500 cubic yards. The total amount of rock excavation carried out in the construction of the two sections of the reservoir was about 500,000 cubic yards. The combined capacity of the two sections is approximately 60,000,000 gallons. The area occupied by the reservoir and surroundings is eleven and a quarter acres, the roof area being over seven acres.

Big Deal Through—One of the biggest deals on record, one that will place the famous Vickers Company in an unrivalled position in the engineering world, has just been arranged with Treasury sanction. Vickers, Limited, is to acquire the Metropolitan Carriage, Wagon and Finance Company, of Birmingham, whose shares have an aggregate value nearly equal to those of the Vickers Company itself. Vickers Limited, formerly known as Vickers, Sons & Maxim, has consistently increased its business by im-

portant acquisitions, with the result that it has either absorbed, or obtained a controlling interest in the Naval Construction and Armaments Company, the Maxim-Nordenfelt Guns and Ammunition Company, Wolsely Motors, and the Electric and Ordnance Accessories Company. Among the countries to which its interests extend are Canada, Spain, Italy, Russia and Japan. It has works in Sheffield, Barrow-in-Furness, Birmingham, Erith, Dartford, Crayford and Ipswich.

Will Finish Boats.—At a meeting of creditors of the Polson Iron Works now being reorganized, held at Osgoode Hall, it was stated that as the result of agreements come to it would be possible to declare a dividend of 54 cents on the dollar. One of the agreements comprised the offer of the Imperial Munitions Board to advance the $400,000 to $600,000 necessary for the completion of five boats under contract, to accept delivery when ready, to waive any claims for damages, and to rank with the unsecured creditors for the money it was found necessary to advance. The Hannaveig Company, who had placed with the company an order for two boats to be completed in 1919 at a cost of $665,000, agreed to take over the two boats and the material on hand and to waive any claim for damage or for the repayment of any amount overpaid. The material, which had cost $335,000, was only worth about $200,000 to-day, but the Hannaveig Company was willing to take back the material to free themselves of damage actions by the persons to whom they had sold the boats. Both offers were accepted by the creditors.

MARINE

Montreal.—The setting of the river buoys in the Lower St. Lawrence is now under way. The Canadian Government steamer Druid is now engaged in this work and the buoys will probably be in place by the end of the month.

Kingston. — One of the Dominion Government's new standard boats for the inland lake trade is to be built by the Kingston Shipbuilding Co. The keel has already been laid, and much progress has been made in assembling the various parts. The vessel is one of the largest ever built in this yard, being 260 feet long, 45 feet beam, and 30 feet in depth.

New York.—Because of the large number of vessels which have been destroyed by floating mines in recent weeks, the New York Board of Marine Underwriters have raised the war risk rate on all vessels and cargoes billed to North Sea, Baltic and Black Sea ports. To Sweden and Norway and Denmark, not beyond Malmo, the rate is now one-third of one per cent., while to Baltic ports it is one-half of one per cent. The rate to Black Sea ports has been fixed at one-half of one per cent. also.

Large Cement Factory.—The Montreal Portland Cement Company, formed of British and Belgian capital have purchased a site of 54 acres at Pointe-Aux-Trembles for $40,000, and work will soon begin on new cement plant to cost $250,000, and eventually turn out 4,500 barrels a day. The company has received exemption from taxation and free water for twenty acres from municipalities at Trenton. President Robert Dodd said no stock will be issued in Canada. The company will be producing 500 barrels daily by September.

Montreal.—The inauguration of a new steamship line from Montreal to Buenos Aires and Montevideo is announced by Messrs. McLean, Kennedy, Limited. The first sailing will be the Steamship Clan Keith, about 8,000 tons, due to arrive in Montreal May 5, to be followed by about monthly sailing thereafter from this port in summer and from St. John, N.B., in winter. This line will be known as the "Houston Lines" Canada-South America service, and will fill a want by Canadian exporters, who have hitherto been obliged to send their shipments through the port of New York.

London. — The new Cunard transatlantic liners will be oil-driven. An official of the Cunard Line verified this statement. It was told in a recent dispatch as illustrating the intense efforts the great British shipping interests are making to hold maritime supremacy.

The Cunard and other associated companies, it is understood, now have twenty-nine vessels in course of construction. Most of them are of the standard type, 20,000 tons, and built to carry both passenger and cargo. They are all being fitted with engines which can be driven either by oil or coal. The alternative is provided because of the uncertainty of readily acquiring the necessary oil supplies.

Montreal.—The breaking up of the ice on the River St. Lawrence has been proceeding steadily and the river is expected to be cleared sufficiently for the starting of traffic by the end of the week. Considerable difficulty has been experienced by the three vessels engaged in the work; the Montcalm was damaged slightly when she was caught in a jam some time ago and, the Lady Grey has been held in a jam among the Sorel Islands for a couple of weeks. During their imprisonment it was necessary for several of the crew of the Lady Grey to make a trip across the floating ice to obtain provisions. Relief, however, is in sight and meantime the ship is in no danger.

Toronto. — Cargo-carriers that have slipped off Canadian ways during the last few months are now carrying goods across the seven seas. An instance of the significance of the enlarged wartime shipbuilding activities in Toronto, is afforded by a recent notification of the United States Navigation Company, that the new 100 A1 Le Quesnoy would soon commence loading for Constantinople, Constanza, Galata or other Black Sea ports. Le Quesnoy was built at the Dominion Shipbuilding Co. plant, at the foot of Bathurst Street, Toronto, and was launched last autumn. This vessel is 4,300 tons deadweight, and is a bulk cargo carrier of the improved Cunard type. Le Quesnoy left Toronto in December for the Atlantic, accompanied by tugs, which encountered rough weather before leaving Lake Ontario. Le Quesnoy completed its journey to Montreal and Halifax, and subsequently sailed for New York to enter the mercantile service.

Transfer of Dry Dock.—The Prince Rupert Dry Dock and Engineering Co., of which Newman Erb is chairman, and also president of the Ann Arbor Railway Company, with headquarters in New York, has leased from the Grand Trunk Pacific the shipbuilding plant and dry dock located at Prince Rupert. Contracts now under way are for two 8,100-ton freighters for the Dominion Government.

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OTTAWA.—It is expected that the Government will decline to grant further licenses to American shipping engaged in the coasting trade in Canadian waters, except under very exceptional circumstances. Intimation that such a course is likely to be adopted was given in the House by Hon. A. K. MacLean, Acting Minister of Marine and Fisheries. Mr. McLean read, first, the following telegram received from Washington: "Advices from our representatives for the Lakes district indicate apparent scarcity business on the lakes for American ships for this season. Coastwise permits are now almost invariably declined on the Atlantic and Pacific coasts, only exceptional situation warranting a departure from this policy." Mr. McLean added: "Inasmuch as the United States declines to confer the privilege upon Canadian vessels engaged in their coasting trade, it is contemplated that no further licenses be granted to American ships for the coasting trade in Canadian waters except under very exceptional circumstances. This will place our policy in this regard on a parity with that of the United States."

CONTRACTS

Contract Awarded.—The MacKinnon Steel Co. Sherbrooke, Que., have just taken a contract for the supply of all necessary steel work in connection with an eight-storey apartment house being erected on Drummond street, Montreal, by P. R. DuTremblay. The name of the general contractor is Alex. MacKay, Montreal. The valuation of the complete structure is five hundred thousand dollars, and the steel work will amount to approximately sixty thousand dollars.

BOOK REVIEW

Punches and Dies for Lay-Out, Construction and Use, by Frank A. Stanley, the McGraw-Hill Book Co., New York. Price $4.00

This book has been written in the object of placing before die-makers, tool makers and tool draftsmen information concerning this class of shop equipment, which is becoming increasingly important in the manufacturing industries. In the preparation of this present work the author has been given free access to the methods in practice of the leading plants of America. For this reason the illustrations, both halftones and line engravings, together with the data given in the book, are especially interesting and valuable to the man having work of this nature in his care. The following subjects are treated in this work: Press tools in general, blanking dies, piercing tools, compound dies for blanking and piercing, shaving dies, trimming and shaving, drawing dies and their action upon materials, combination and compound dies for blanking, drawing and piercing, bending, forming and other dies, dies for embossing, marking, riveting, and indexing dies. The sub-press and its dies, laying out and making templets and dies, some hardening principles applied to dies.

MANY CREDITORS IN POLSON AFFAIRS

Statement Handed Out by Official Receiver Clarkson—Some Work to be Finished

ASSETS

Materials and supplies, inventory value	$400,000
Receivables	25,000
Lands and buildings valued at	1,400,000
Plant and equipment appraised at	550,000
Total	$2,375,000

LIABILITIES

Bonded	$300,000
Preferred claims	100,000
Norwegian contractors	568,000
Unsettled damage claims	70,000
Other claims	50,000
Trade creditors	400,000
Total	$1,488,000

MEMO

The Imperial Munitions Board is the owner of five boats and materials therefor, on the premises, the completion of which is being undertaken. The cost of completing these boats is now being ascertained.

The above statement of the situation of the Polsons Iron Works was handed out by the receiver, G. T. Clarkson.

The statement shows that there are nearly two hundred trade creditors. There are two items larger than $20,000 to Canadian metal people, one of over $10,000, and the rest running all the way from a few hundred dollars to $10,000.

The preferred claims of $100,000 are made up of wages, $72,000; Compensation Board, $15,000; taxes, $10,000 and water rates, $3,500.

Two Boats Completed

Since the company went into receivership two of the five boats have been completed for the Imperial Munition Board. Another boat will be ready in May and the remaining two before the close of navigation.

It is understood that the Polsons Iron Works last year received several offers for the undertaking which would have produced a very substantial profit to the shareholders, but under present circumstances it is entirely unlikely that it will be possible to now sell the assets at prices which at the most would leave very much for the shareholders.

German textile industries not only used paper as a substitute for wool and cotton but also made great use of hair, human and from dogs and other animals. Great hopes were based on a scheme for the breeding of rabbits of the white silken haired variety but nothing was done as presumably rabbits made good stew or pie. The scheme which may yet be carried out involved the breeding of several million rabbits. The hair may be spun into very fine and soft threads.

IN SOME CASES THERE IS ALREADY TALK OF LOWER PRICES COMING

THERE are several factors tending to decrease the production of pig iron. The demand generally is very small, and much confusion is still in evidence over the new prices. Many more stacks are being blown out. Following are the reports from U.S. points:

CHICAGO.—There is no particular anxiety on the part of the consumers to buy for last half needs. Makers are waiting to see some action on the part of the Government before taking any steps. What buying there is, is confined to small lots for immediate delivery.

NEW YORK.—The principal factor in the market here has been the refusal of Railroad Director Hines to buy at the new price schedule. Several makers were considering the application of the new price to old contracts, and some of them had already made readjustments. Consumers now expect a further price drop. An increase in freight rates is another important factor. Several New Jersey points that have had a preferential rate over New York and Brooklyn, have now had their rate brought up to the same figure as the latter points.

PHILADELPHIA. — The slight improvement in the demand noticed recently is still being maintained, but enquiries are few. There are many enquiries for export, which do not arouse much interest. One company is inquiring for 50,000 tons a month. There are many stacks being blown out.

PITTSBURGH.—A fair number of enquiries for small lots, with little actual business and an open market are the leading features here. The recent enquiry of the Standard Sanitary Manufacturing Company for 3,500 tons southern foundry iron for its Louisville plant, has been about half covered. The order has been divided between an Ohio and a Tennessee furnace. It is believed that conditions are such that if a good-sized enquiry was to come out sharp competition would result.

BUFFALO.—Any buying that was probable has been stopped for the meantime by the controversy at Washington over prices. Enquiries are very few, but there is a hopeful spirit among producers. One local maker sold 1,000 tons basic at the usual price.

CLEVELAND.—There has been a fair amount of sales and a pretty brisk enquiry. Foundries serving the automobile trade have been the biggest buyers. Sales amount to between 5,000 and 10,000 tons, mostly for first half delivery. The price situation is still awaiting some definite action from Washington.

CINCINNATI.—There is practically no enquiry, due to the unsettled state of the price situation. Some sales are being made of occasional carload lots and some enquiries are in evidence from parties who are trying to feel the market out. Until producers take a definite position there is not much expectation of business.

BIRMINGHAM.—Banking and blowing out of furnaces are the most prominent features of the situation. Iron production is being kept down to a minimum and sales show no improvement. There is a small amount of local buying in hopes of later improvement in business.

PROMOTIONS AT THE STEEL CORPORATION

SYDNEY, C.B.—A number of new appointments are announced in connection with the staff at the works of the Dominion Steel Corporation.

One of the most important of these appointments relates to the creation of a department for the purpose of investigating with a view to eliminating wasteful practices in the various departments of operation, and, in general, the introduction of economical processes. In this connection F. E. Lucas has been appointed as economy engineer.

A. L. Reading becomes superintendent of the rail mill, and W. Buckley becomes assistant superintendent.

W. Waishaw has been appointed roll designer, allusion being to the designing of rolls employed in the various rolling processes carried out by the company.

C. C. Graves becomes superintendent of the blooming mill.

S. Green becomes superintendent of all of the night mills.

The above appointments have all been made from men who have been in the employ of the company for at least seven years, and who have consequently become thoroughly acquainted with the employees and with the requirements of the situation. In consequence greater efficiency and smoothness of operation are looked for.

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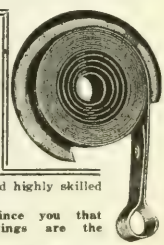
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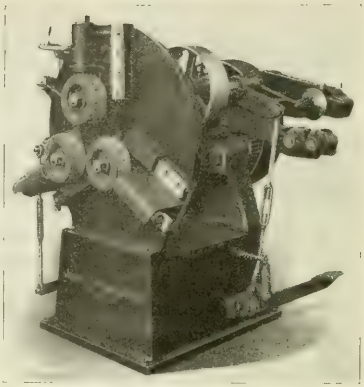

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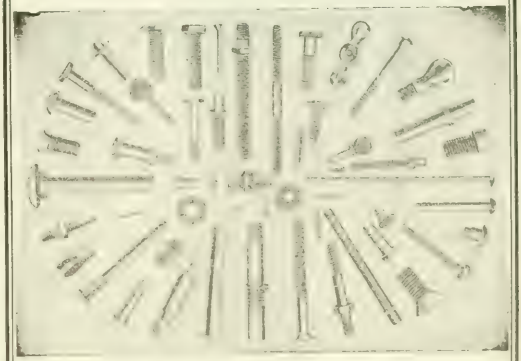

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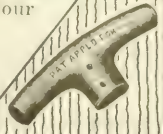

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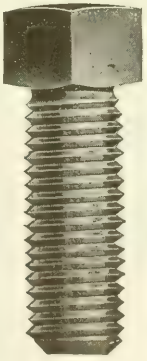

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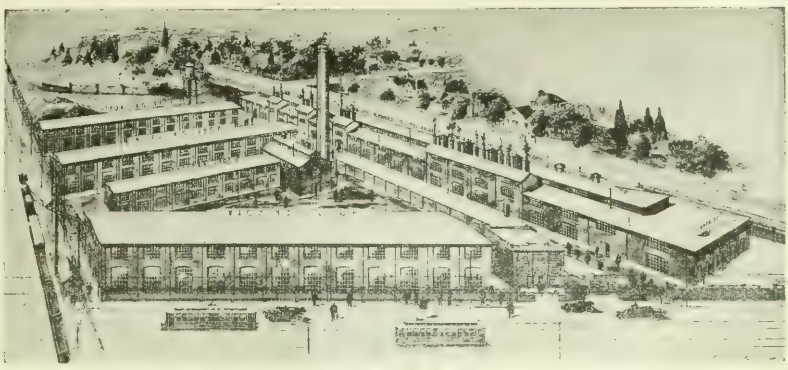

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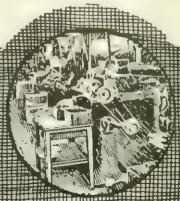

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So that to the extent that it has overcome precedent in machine design, or upset traditions in bearing practice, S K F means more than a kind or type of bearing: it is a brand of service — working in the cause of better machine practice.

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Simple
Few parts — easy adjustments — quick change of chasers — nothing complicated to get out of order.

Strong
Solid one-piece body.
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Positive releasing and setting action.

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All parts that are subject to wear are hardened and ground to a precise fit.

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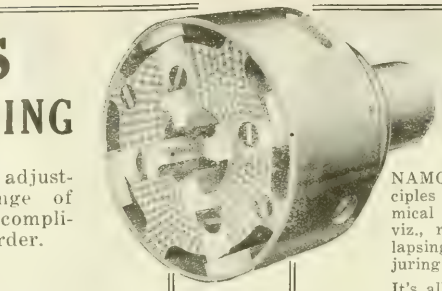

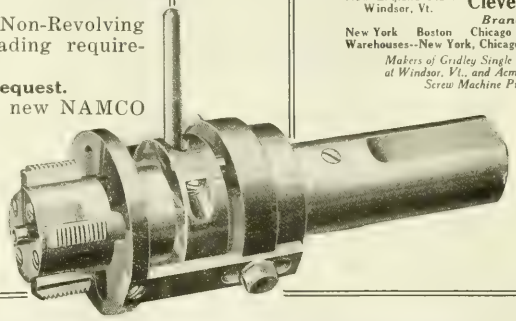

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NAMCO Taps embody all those principles essential to the rapid and economical production of clean-cut threads, viz., rigidly held chasers, positive collapsing, withdrawal of tap without injuring thread, and positive re-setting.

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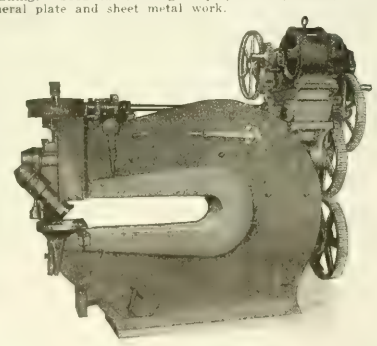

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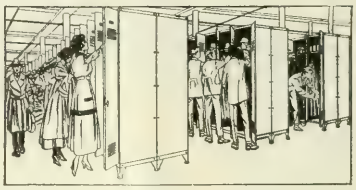

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We have pioneered in this industry and maintain our leadership by uniform excellence of product. Let our Engineering Dept. assist you with plans, detail drawings, estimates, etc. Write for illustrated folders to-day.

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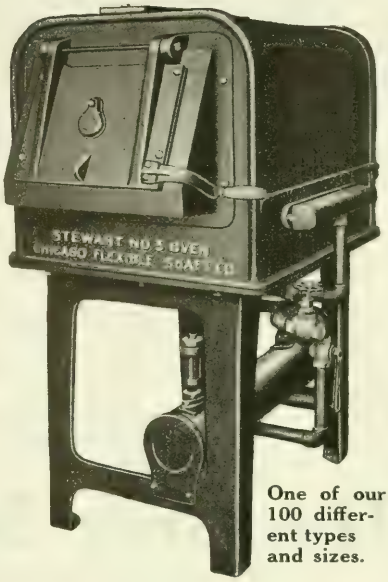

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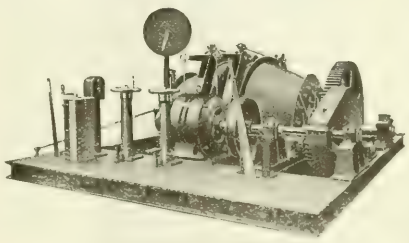

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Bristol Hand Milling Machine With Power-Feed Attachment

You'll find this machine very desirable for the manufacture of small parts on which the operation is confined to table feed. The Power Feed assures more accurate work and better finish than can be obtained by using the hand feed, due to the fact that the feed is positive and eliminates all chatter.

Many operations which have hitherto been done on larger machines can be done more economically on this type of Miller.

Let us help you solve your problems. Our experts are at your service.

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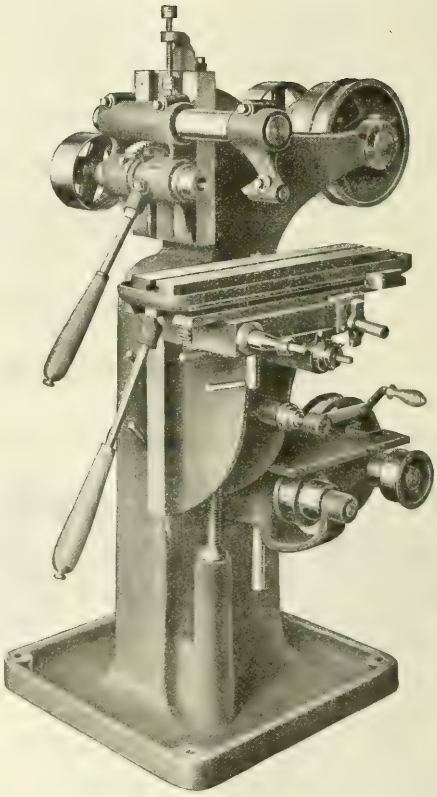

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SUCCESSORS TO C. G. GARRIGUS MACH. CO.
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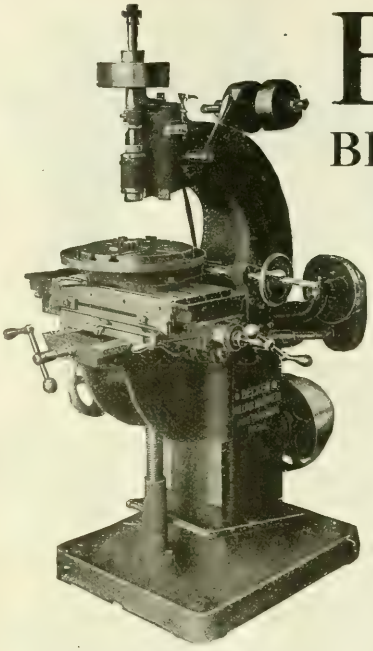

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are machine shop necessities; they do work that formerly required planers, shapers, boring mills and other machine tools of this class, and do it quicker, better and cheaper than did the tools they displace.

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Your next machine tool should be a Becker Belt-Driven Milling Machine. They are efficient.

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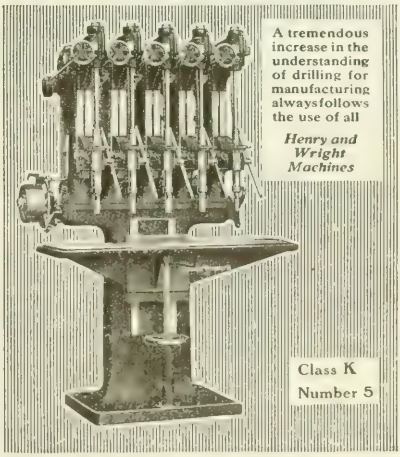

A tremendous increase in the understanding of drilling for manufacturing always follows the use of all *Henry and Wright Machines*

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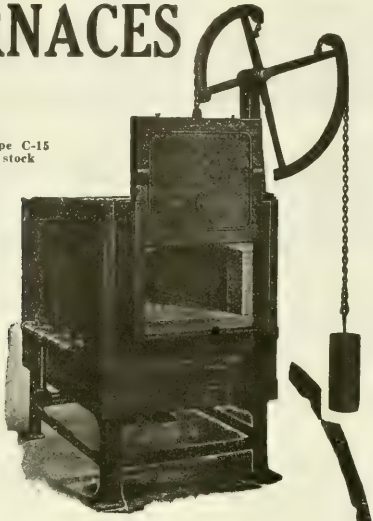

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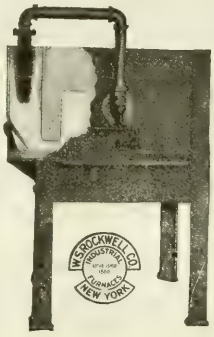

It is economical in fuel, air and power; protects workmen from flame and hot gases and the heated material from oxidation or scale; increases the quantity and improves the quality of heated products; prevents smoke, flame and heat escaping into forge shop.

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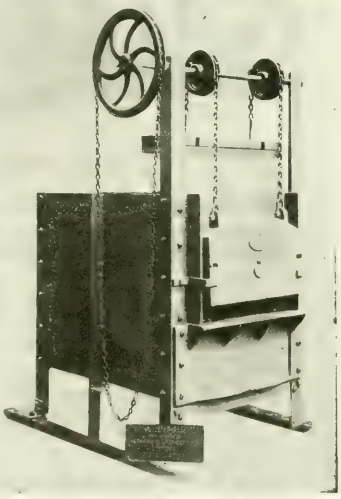

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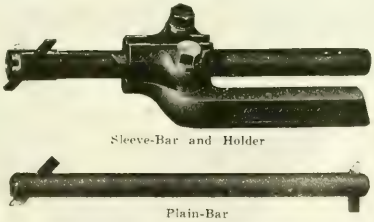

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Williams' "Agrippa" Boring-Tool Holders for Multiple Bars

Raise no bar against the selection of Bars. The choice is yours

The "twin-screw" fastening with V groove at top and bottom accommodates any size and shape of bar within its range.

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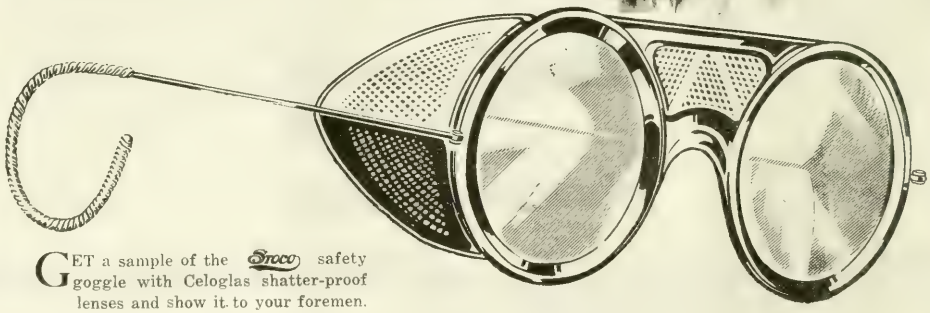
These STOCO CELOGLAS SHATTER-PROOF LENS SAFETY GOGGLES will make my men EYE SAFE



GET a sample of the STOCO safety goggle with Celoglas shatter-proof lenses and show it to your foremen. Have them give it a trial under actual working conditions, and it won't take them long to decide that it's the kind of eye protection their men need.

The STOCO safety goggle frame is the strongest ever designed for eye protection purposes. In spite of its sturdy construction it is light in weight and mighty comfortable in use.

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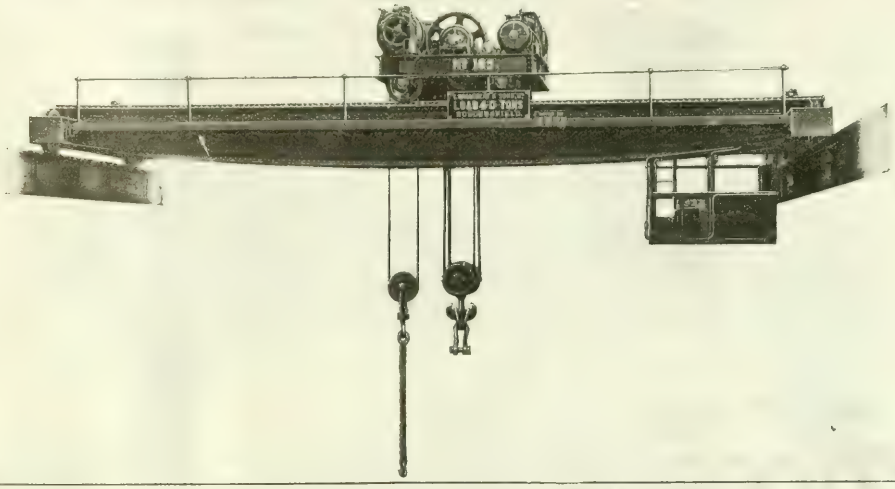

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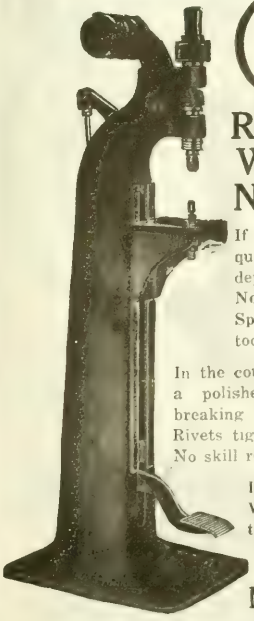

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If you want peace and quietness in your riveting department, the **Grant Noiseless Rotary Rivet Spinning Machine** is the tool you need.

In the course of a second it spins a polished rivet head without breaking or marring casting. Rivets tight or loose as you wish. No skill required to run it.

It's a real cost-cutter. Write for more information.

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are dependable springs

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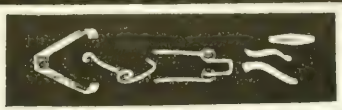
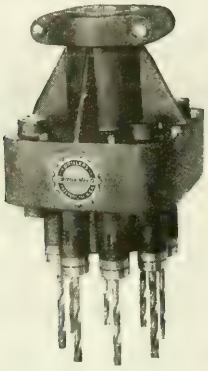


The Dunbar Brothers Co. BRISTOL CONN.

2 Minutes or 20?



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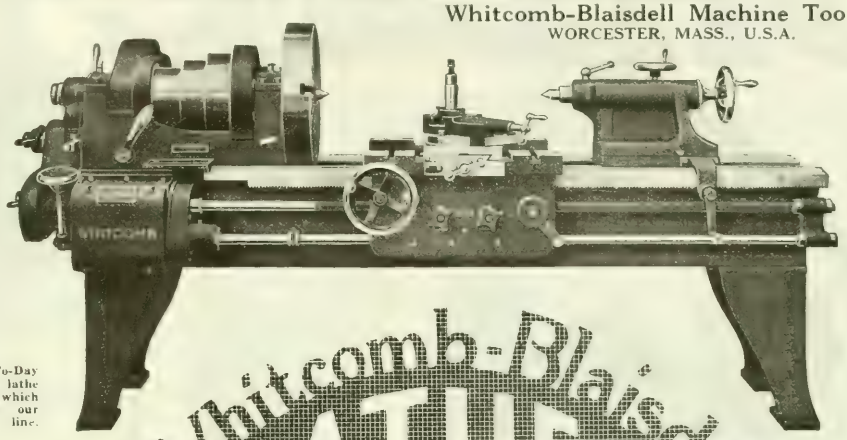

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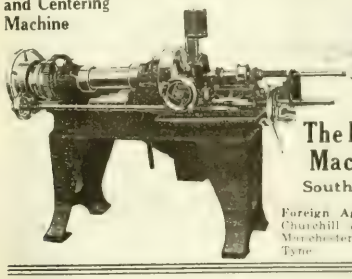
Another Cuts Down
and
They Both Cut
At Once

Hurlbut, Rogers Cutting-off and Centering Machine



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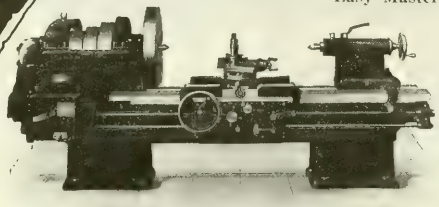

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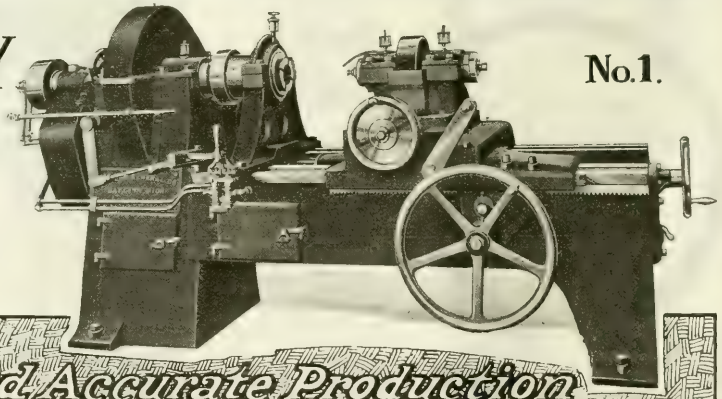

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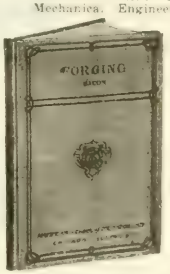

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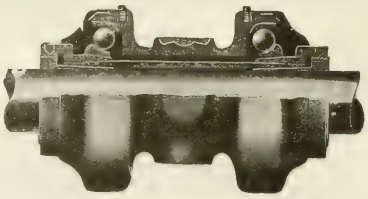

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Other Outstanding Features of April MacLean's

"Imperial Relations Must be Worked Out," by Viscount Bryce. An important announcement on the future construction of the British Empire.

"Reconstruction in Turkey," by Stephen Leacock. A humorous article on the present condition of things in Turkey as seen by Canada's great humorist, and applied to Canadian conditions.

"Bulldog Carney," by W. A. Fraser. A splendid novelette of the Canadian West, complete in this issue. Illustrated by Charles L. Wrenn.

"Opening the New Book," by J. K. Munro. An article on the situation at Ottawa created by the new Liberal leadership—smashing, impartial, fearless.

"The Sun Gazer," by Charles G. D. Roberts. A remarkable animal story. Illustrated by Artheur Heming.

"Canada's Fishmonger General," by Thomas M. Fraser. An article on a young Canadian who put Canadian fish on the diet of the British armies by a series of Barnum and Bailey advertising stunts.

"Bombing the Boche," by Lieut. J. Vernon Mackenzie. The second of the two articles that Mr. Mackenzie has written on the whirlwind campaign of raid reprisals which so frightened all Germany.

"The Transformation," by Frederic S. Isham. Illustrated by Hanson Booth. The second instalment of this sparkling new serial.

"Man and Wife," by C. W. Stephens. Illustrated by R. M. Brinkerhoff. The first instalment of a three part story of Canadian life by a new Canadian writer—a delightful love story with a background of business intrigue.

The Review of Reviews

The best articles from all publications the world over are selected and condensed for this department. Some of the articles in the April number are:

The Man Behind Bolshevism.
Could German Fleet have been Destroyed.
The Secret Plans of the Allied Command.
Too Much Wilson.
Is the ex-Kaiser Haunted?
Next Government Will be Labor.
New Life of Deposed Princess.
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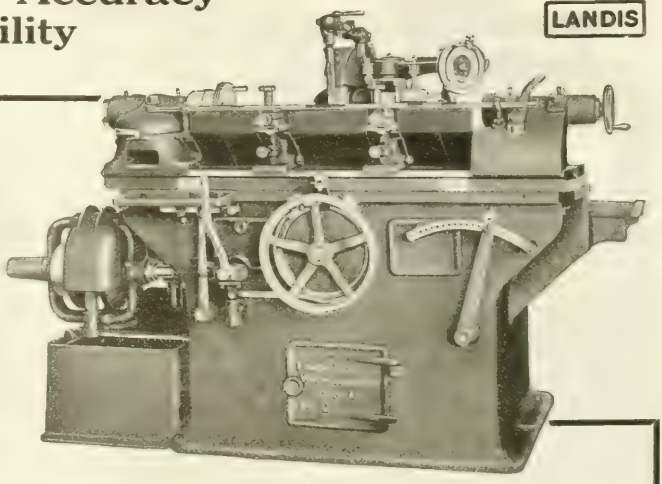

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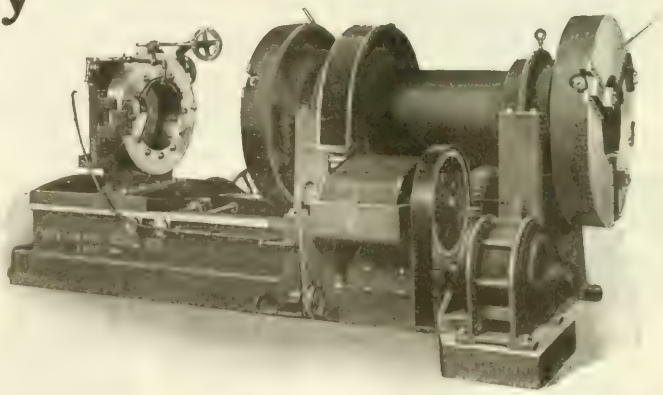

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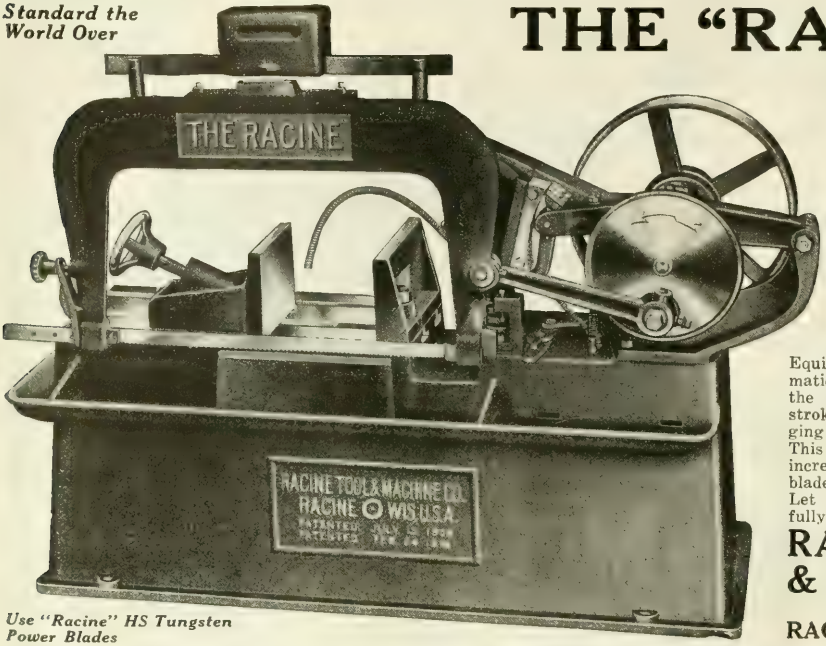

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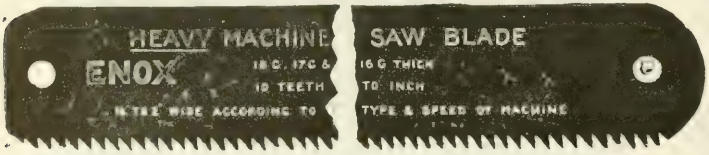

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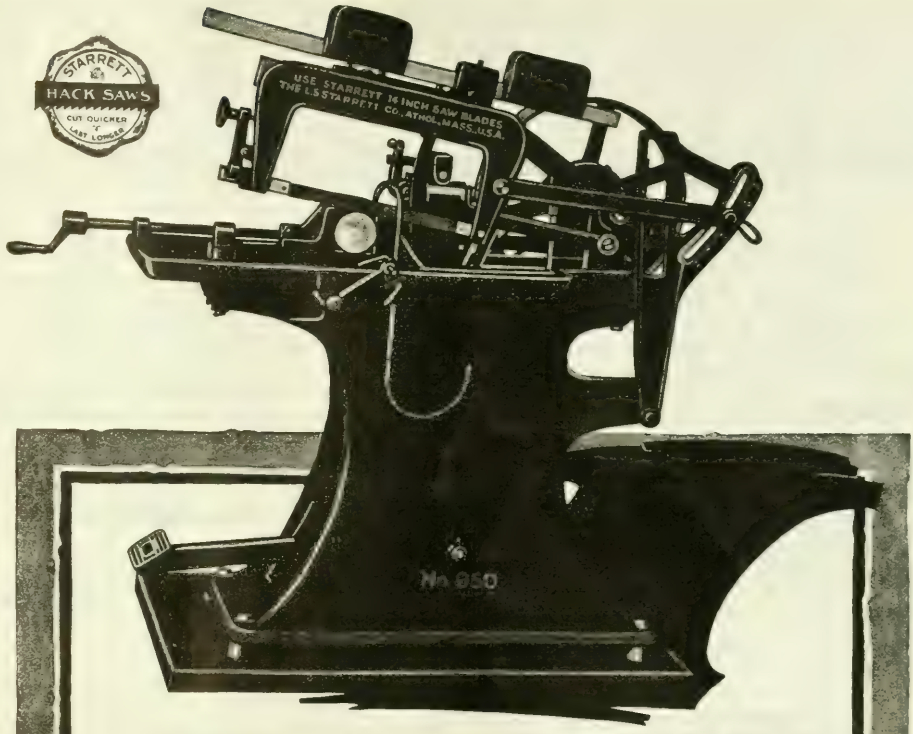

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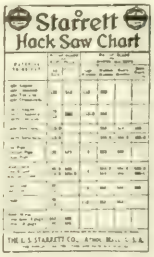

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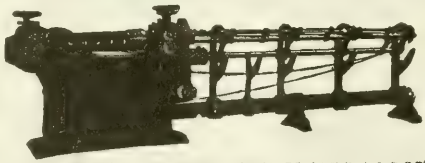

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Skinner Planer Chucks
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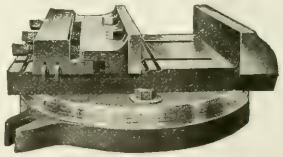

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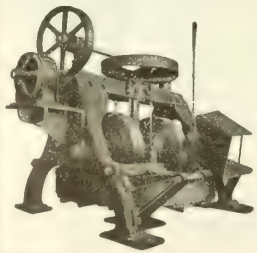

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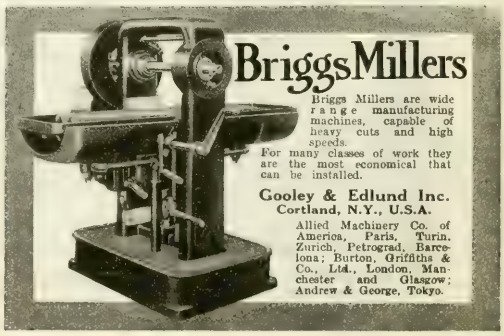
Heavy Mullers
Unloading Device
Motor or Belt Drive
The Frost Mfg. Co.
112 W. Adams St., Chicago



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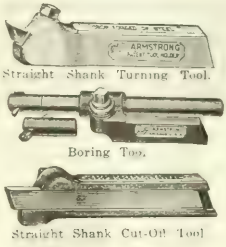

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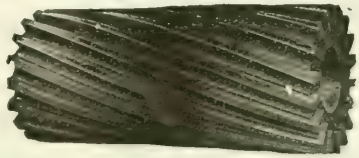

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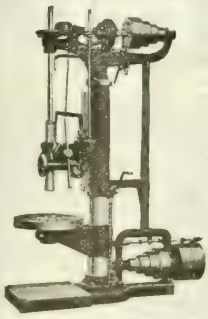

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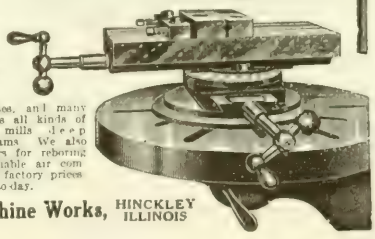

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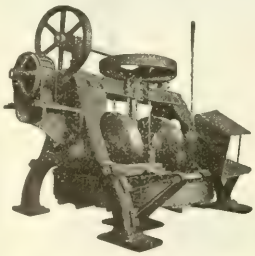

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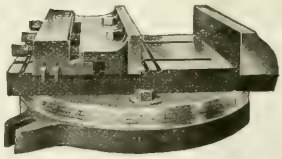

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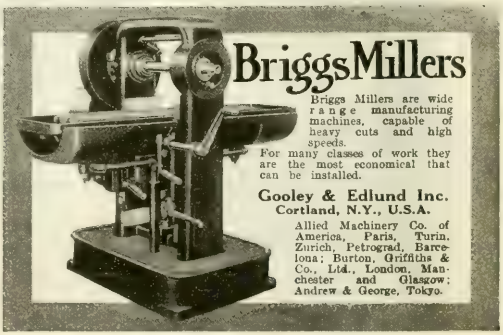

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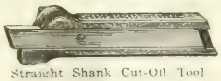

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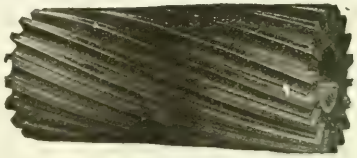

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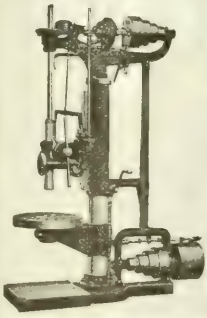

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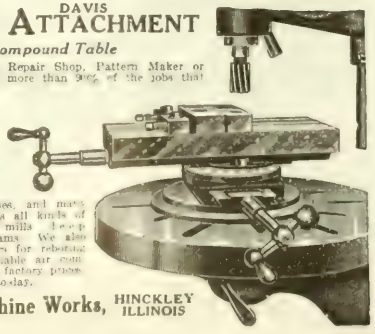

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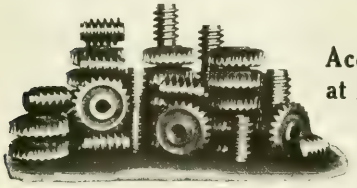

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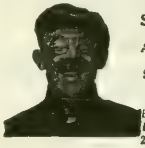

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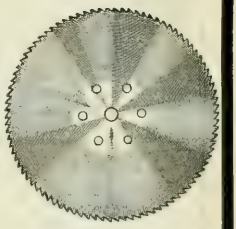

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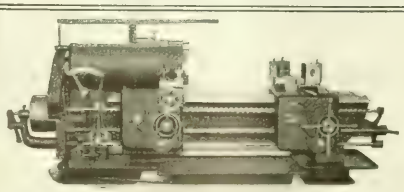

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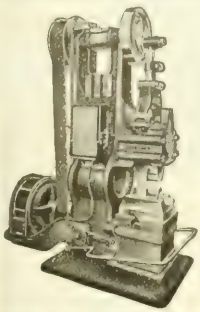

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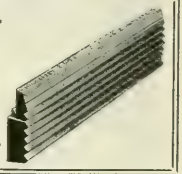

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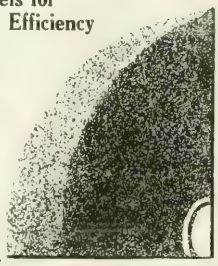

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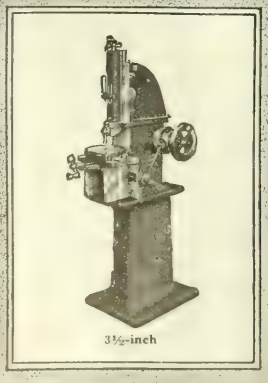
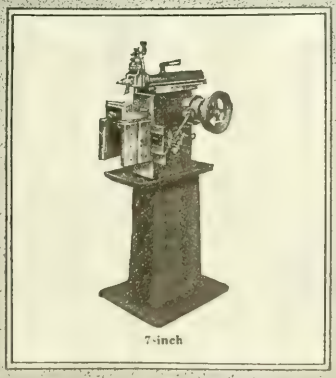


3½-inch



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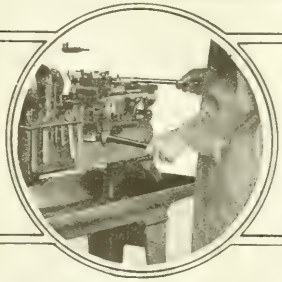

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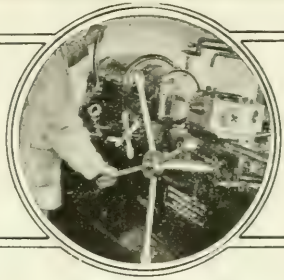

Two Lever Control

On bar stock and work of a similar nature the operator manipulates the turret by means of a lever or pilot wheel with his right hand while with his left he feeds the cross slide tools to the work, and at the end of the operation, when the piece is cut off, pushes the cross slide forward slightly, automatically bringing the next length of stock instantly into position ready for the tools. This largely eliminates making lost motions as the operator remains in the same position at all times.

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All Levers, Clamps and Pilot Wheels right under the Operator's hands

Three Lever Control

The three lever control is on the larger type machines. The operator manipulates the turret tools by means of a pilot wheel with his right hand while with his left he feeds the cross slide tools to the work and at the end of the operation when the piece is cut off, throws the feed lever which is located on the front of the headstock, in, the stock advances till it reaches the stop and when the lever is released the chuck closes firmly holding the stock. Every crank and lever is so located that the labor involved in operating the machine is a minimum amount.

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That means a lighter and stronger machine a machine built to take a lot of punishment. **Write for Catalog P S-16**

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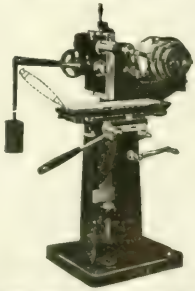
Hand Milling Machine

Thousands in Use



The Sliding Head makes the vertical feed independent of the horizontal feed. This feature permits the work to be fed lengthwise to the table and enables the machine to be used for profiling. As the head is accurately counterbalanced, light milling may be done on long and heavy pieces. Although capable of breaking cutters.

The spindle is driven by interchangeable cut gears giving six spindle speeds with three grade cone and four with two grade cone.

The Table has Hand Lever Feed also Quick Feed operated by Rack and Pinion.

The Pinion Shaft is mounted in an eccentric bushing to allow for adjustment of pinion with rack.

The weight attachment feeds either head or table automatically and by varying the weights the pressure may be adjusted to a nicety.

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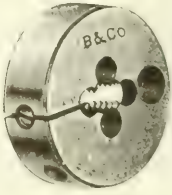

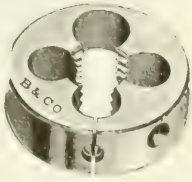

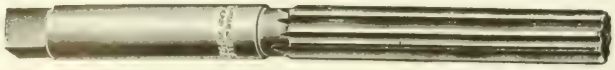

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John Bertram & Sons Co., Dundas.
Garlock-Walker Machinery Co., Toronto, Ont
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. MacDougall Co., Galt.
Reed-Prentice Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, VERTICAL
Giddings & Lewis Mfg. Co., Fond du Lac, Wis

DRILLING MACHINES, WALL RADIAL
Lyne Farquhar Co., Boston, Mass.
Wickes Bros., Saginaw, Mich.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLS, BENCH
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati
Williams & Wilson, Limited, Montreal, Que.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

EARTH HANDLING EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

EFFICIENCY ENGINEERING SERVICE
Anderson's Efficiency Service, Toronto, Ont.

ELECTRIC FURNACES
Electric Steel & Metals, Ltd., Welland, Ont.
General Steel Ind., Millwaukee, Wis.

ELEVATOR ENCLOSURES
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Canada Wire & Iron Goods Co., Hamilton, Ont.

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Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

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Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

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Albany Hardware Spec. Co., Albany, Wis.

DRILLS, HIGH SPEED, TWIST
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Armstrong, Whitworth of Canada, Montreal, Que
Atkins & Co., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Montreal.
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McKenna Brothers, Pittsburgh, Pa.
Marshall & Co., Geo., Toronto, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

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Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
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A. R. Williams Machy. Co., Toronto.

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Morse Twist Drill & Mch. Co., New Bedford, Mass
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
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A. R. Williams Machy. Co., Toronto.

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ELEVATOR WEIGHTS
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ELEVATORS AND BUCKETS
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Can. Matthews Gravity Carrier Co., Toronto, Ont.
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Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
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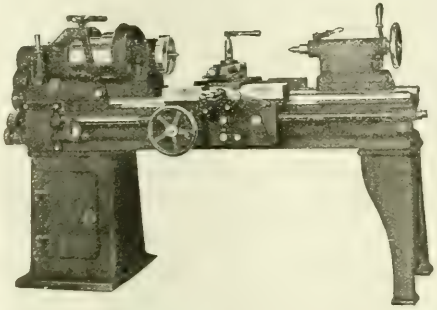

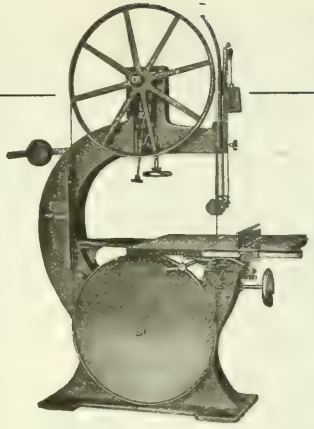

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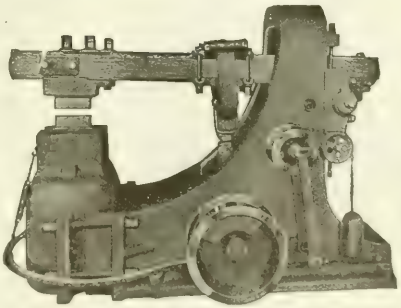

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Wells Bros. of Can., Galt, Ont.
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Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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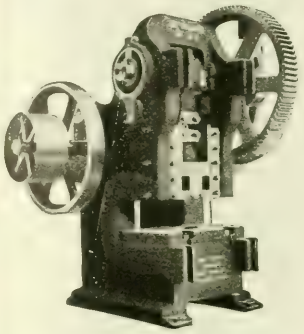

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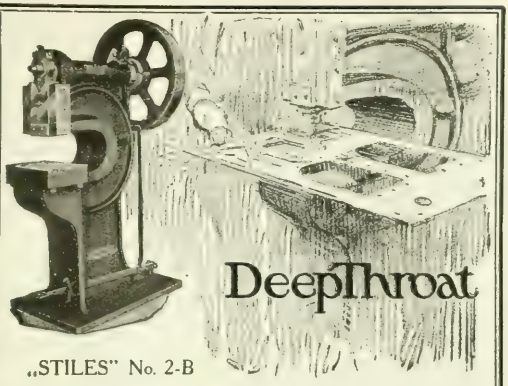

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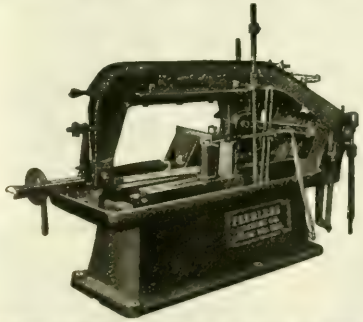

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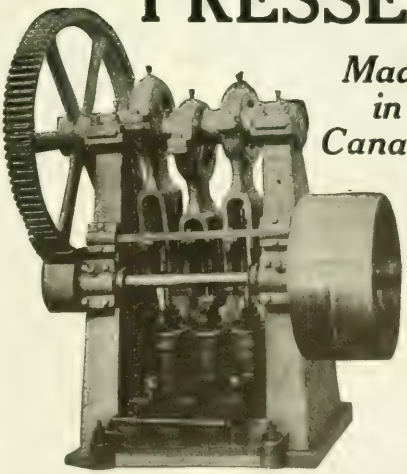

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Gardner, Robt., & Son, Montreal.
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Electric Steels & Metals, Ltd., Welland, Ont.
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Northern Crane Works, Walkerville, Ont.
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To-day Canadian Prairies are Giving Place to Factories

SPEAKING at Leeds, England, the other day, Lloyd Harris, chairman of the Canadian Trade Commission in London, said: "Canada must no longer be thought of simply in terms of prairies, but in terms of factories. The economic effect of the war had been to change Canada within four years from a primarily agricultural to a predominantly industrial country. In the year ending March, 1914, the value of exported manufactures was $57,000,000, against agricultural exports valued at $198,000,000. In the year ending March, 1918, the value of exported manufactures was $636,000,000, against the value of exported agricultural products of $567,000,000."

U.S. Firms to Conduct Export Trade from Canada

The announcement from Detroit that the Maxwell Motor Car Company is planning to conduct its entire export business from Windsor, and that $6,000,000 will be spent in the next eighteen months on extensions and new construction work at the plant at Walkerville, is only one of a number of contemplated industrial developments which reflect the importance of Canada's favorable trade relations with Great Britain. And in this connection the recent arrangements effected through the activities of Lloyd Harris and the Dominion Trade Mission are significant.

The Financial Post Informs You Early on Business Developments

Canada is gradually going forward into vastly greater industrial development. It will pay you to keep in close touch with the whole Dominion in this respect. For this purpose THE FINANCIAL POST is undoubtedly the paper for you. The information given above is from THE POST of April 12th (Special Insurance Issue). Here are a few more titles from the same issue:—

Advances for the Industrials Recent Feature
Discriminate Use of Pruning Knife in Tariff
Nearly $1,000,000 for Canadian Shoes
Montreal Cement Co. to Erect Big Plant
Canadian Trade Commission Gets Big Timber Order
Millers Seek Assistance of Government
Globe Attitude on Abitibi Paper is Bolshevism
Steel Industry Unsettled by Price Fixing
People Must Discharge the Debt of the Nation
Railroads for Tariff Commission
Ames, Holden Dividend in Light
Dividend Nead for Atlantic Sugar
Dominion Iron Making Claim to $21,000,000
Montreal Power Refuses to Bow to Union Demand
Goodwins Show $34,000 Gain in Gross Profits
Business Ideas in Financing Stock Raising
Reserve Bankers Favor Canadian Bank System
Can Sir Adam Beck Run Toronto? (Editorial)
Purchasers of Manitoba Bonds are Disclosed
Moose Jaw had Surplus from 1916 Operations
March Building Permits Show Good Gain Over 1918
House Demand in Toronto is Very Brisk

INSURANCE SECTION

Enormous Expansion in Fire Insurance
Marked Growth of Automobile Insurance
Burglary Insurance Co.s Meet Heavier Losses
Life Companies Swamped With New Business
Actuaries Favor 'With Profit' Life Policies
Advantages of Commercial Life Insurance Recognized
Business Grows in Employers' Liability Field
Important Part Played by Current Surplus Earnings
Influenza did not Boom Health Insurance so Much
Fire Co. Stocks may be Very Lucrative
More Demand for Mortgage Loans is Taking Place
Types of Policy that Have the Call

Business Building News Items Appear Each Week in *The Financial Post*

The above are only a few of the many subjects of real profit-making interest to Canadian men of affairs which have been dealt with by expert writers and editors in THE POST of April 12th. THE POST will keep you informed on Canadian business matters in a way unrivalled by any other publication. Send for a subscription to-day. The price is $3.00 per year, and you have only to fill in this form:

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Reed-Prentice Co., Worcester, Mass.
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Sidney Tool Co., Sidney, Ohio.
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Walcott Lathe Co., Jackson, Mich.
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Cisco Machine Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Hardinge Bros. Inc., Chicago, Ill.
Wickes Bros., Saginaw, Mich.
Hepburn, John T., Ltd., Toronto.
Niles-Bement-Pond Co., New York.
Riverside Machinery Depot, Detroit, Mich.
Whitcomb-Blaisdell Mach. Tool Co., Worcester Mass.
A. R. Williams Machy. Co., Toronto.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SPEED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SPINNING
Bliss, E. W., Co., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J.
Williams & Wilson, Limited, Montreal, Que.

LATHES, TOOL ROOM
Cisco Machine Tool Co., Cincinnati, Ohio.
Williams & Wilson, Limited, Montreal, Que.

LATHES, TURRET, HAND, HORIZONTAL
Acme Machine Tool Co., Cincinnati, Ohio.
Bertram, John, & Sons Co. Dundas Ont.
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Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
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Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Mullner-Eslund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

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St. Lawrence Welding Co., Montreal, Que.

LEATHER STRAPPING
Graton & Knight Mfg. Co., Worcester, Mass.

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Standard Optical Co., Geneva, N.Y.

LIDS, SCREW TOP AND HINGE
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Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Dennis Wire & Iron Works, London, Ontario.

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Elm Cutting Oil Co., Toronto, Ont.
Ontario Lubricating Co., Hamilton, Ont.

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Bowser & Co., S. F., Inc., Fort Wayne, Ind.

LUBRICATORS
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MACHINERY, CORNER AND BENDING
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MILLING ARBORS
Kearney & Trecker Co., Milwaukee, Wis.

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Baxter & Co., Ltd., J. E., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
The Geo. N. Foss Mchy. & Supply Co., Montreal.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, HAMMER AND NAIL
Garlock-Walker Machinery Co., Toronto, Ont.

MACHINERY GUARDS (SEE GUARDS)

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Prest-O-Lite Co., Inc., Toronto, Ont.
A. R. Williams Machy. Co., Toronto
Williams & Wilson, Ltd., Montreal, Que

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Clipper Belt Lacer Co., Grand Rapids, Mich.

MACHINES, RUNNING, BALANCING
Norton Grinding Co., Worcester, Mass.

MACHINE SHOP WORK
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Marten Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
MacGovern & Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.
J. H Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Morse Twist Drill & Mach. Co., New Bedford. Mass.
Pratt & Whitney Co., Dundas, Ont.

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Matthews, Jas. H., & Co., Pittsburgh, Pa.

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The Geo. F. Foss Mchy. & Supply Co., Montreal.
Perrin, Wm. R., Toronto.
Williams & Wilson, Limited, Montreal, Que.

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Pratt & Whitney Co., Dundas, Ont.

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Canada Metal Co., Toronto, Ont.
Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Ensuhevsky & Son, B., Toronto, Ont.
International Metal & Trading Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que
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METERS
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Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Limited, Montreal, Que.

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Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.
Kearney & Trecker Co., Milwaukee, Wis.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Bristol Machine Tool Co., Bristol, Conn.
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Bertram, John, & Sons Co., Dundas Ont.
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Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

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Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co. New York.
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Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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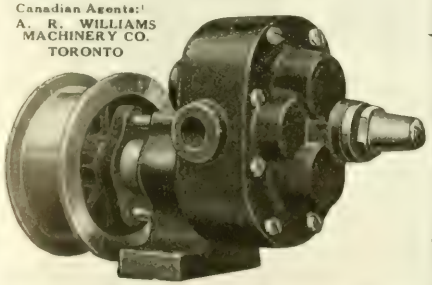

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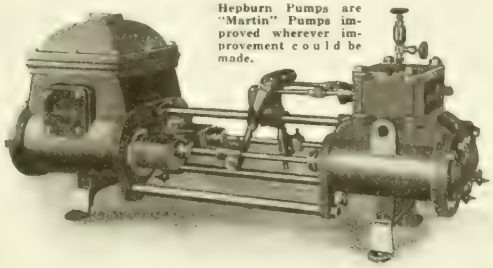

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Niles-Bement-Pond Co., New York.
Stoll Co., D. H., Buffalo, N.Y.
Wickes & Co., Saginaw, Mich.
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Wickes & Co., Saginaw, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Taylor Instrument Co., Rochester, N.Y.
Tbwing Instrument Co., Philadelphia, Pa.

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Wickes & Co., Saginaw, Mich.

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Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Pratt & Whitney Co., Dundas, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
The McCrosky Reamer Co., Meadville, Pa.
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Wells Bros. of Can., Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co., Walkerville, Ont.

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Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Kelly Reamer Co., Cleveland, O.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
The McCrosky Reamer Co., Meadville, Pa
Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Greenfield Tap & Die Corp., Greenfield, Mass.
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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, EXPANDING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, PIN
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMERS, TAPER, BRIDGE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Cleveland Pneumatic Co. of Canada, Toronto.
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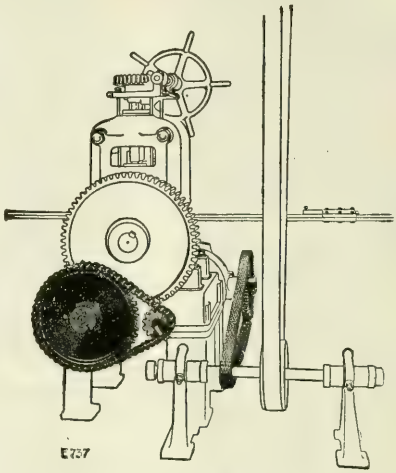

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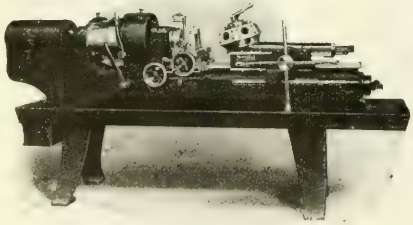

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A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XXI. TORONTO, APRIL 17, 1919 No. 16

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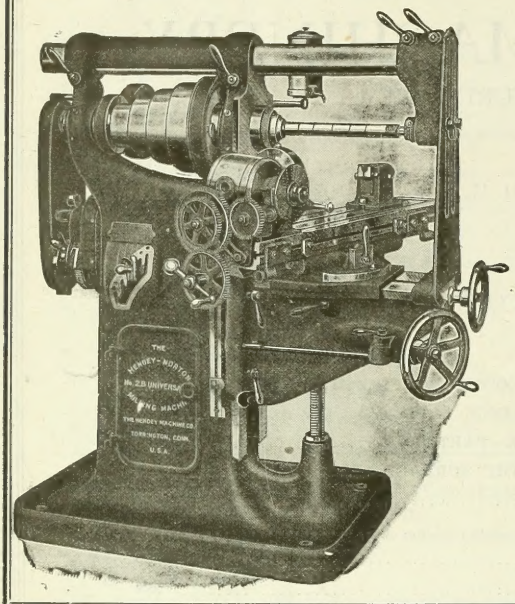

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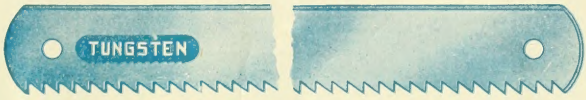

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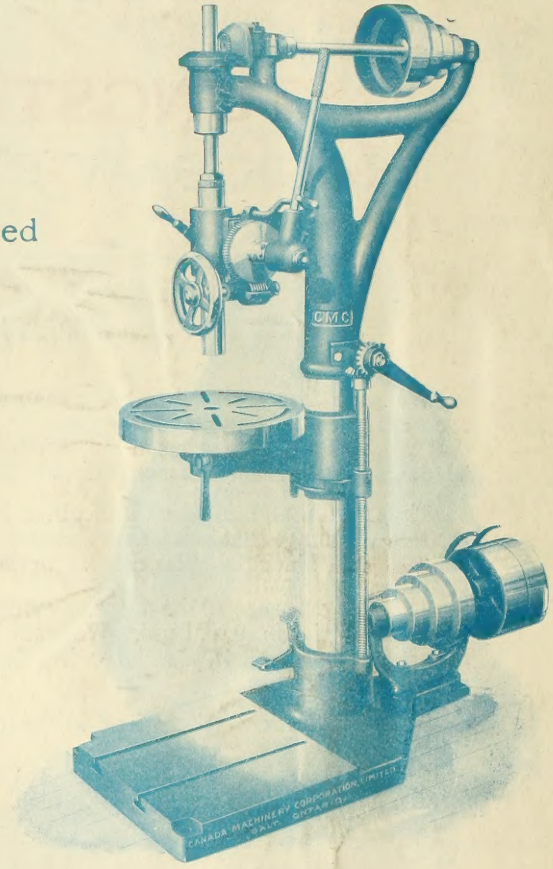

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